ICD 08241

Amateur Radio

CQ

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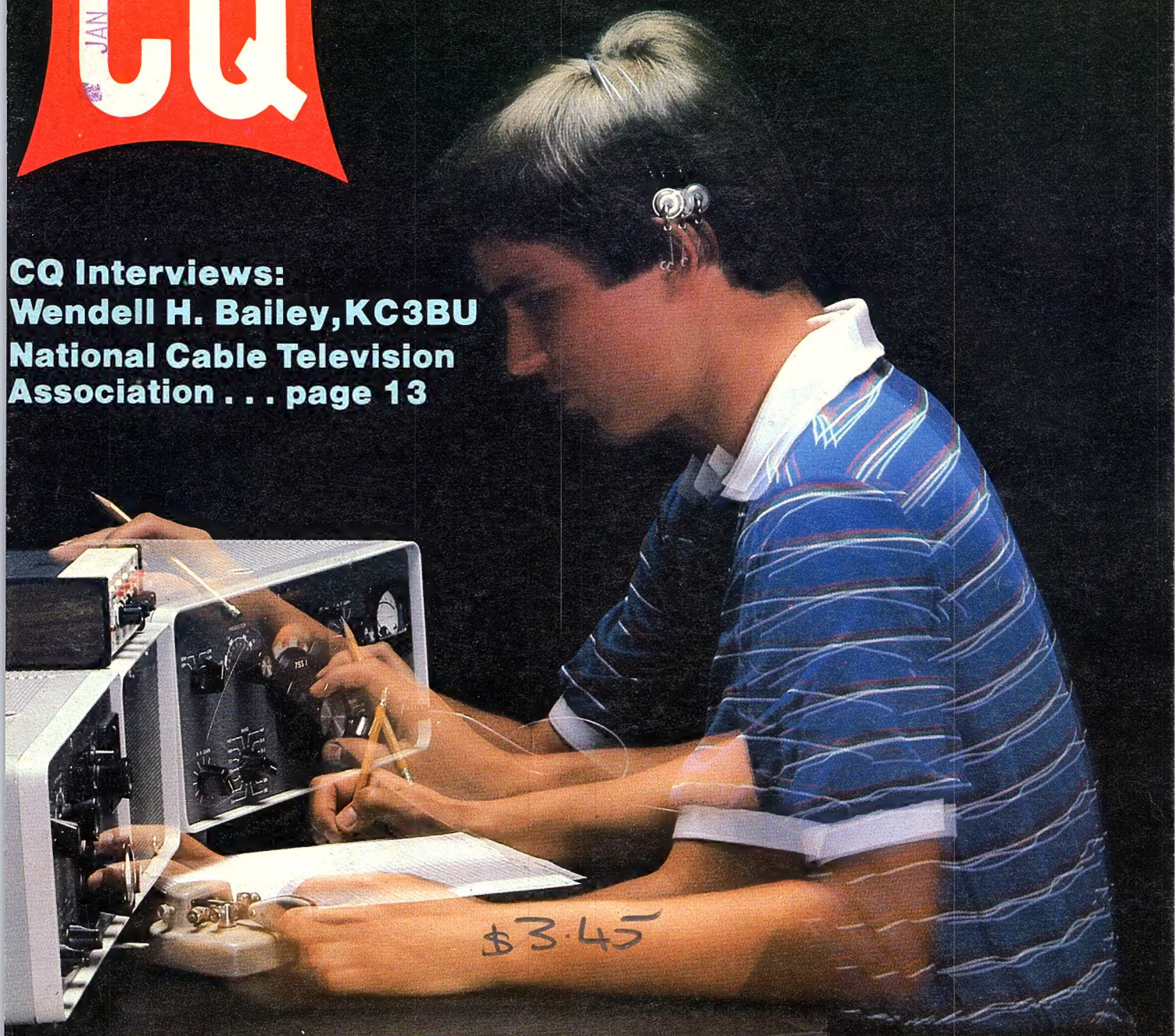
OCTOBER 1982 $2.00



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THE RADIO AMATEUR'S JOURNAL

TR-2500

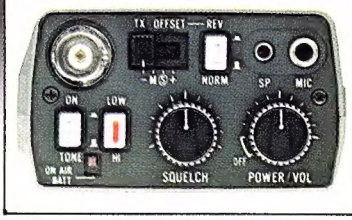
BIG performance, small size, smaller price!

The TR-2500 is a compact 2 meter FM handheld transceiver with every conceivable operating feature.

TR-2500 FEATURES:

- Weighs 540 g, (1.2 lbs). 66 (2-5/8) W x 168 (6-5/8) H x 40 (1-5/8) D, mm (inches).
- LCD digital frequency readout.
- Ten memories includes "MO" for non-standard split repeaters.
- Lithium battery memory back-up, built-in, (est. 5 year life).
- Memory scan.
- Programmable automatic band scan, and upper/lower scan limits; 5-kHz steps or larger.
- Repeater reverse operation.
- 2.5 W or 300 mW RF output. (HI/LOW power switch).
- Built-in tunable (with variable resistor) sub-tone encoder.
- Built-in 16-key autopatch.
- Slide-lock battery pack.
- Keyboard frequency selection.
- Covers 143.900 to 148.995 MHz.

CONVENIENT TOP CONTROLS



- Optional MS-1 mobile or ST-2 AC charger/supply for operation while charging.
- Battery status indicator.
- Complete with flexible antenna, 400 mAH Ni-Cd battery, and AC charger.

Optional accessories:

- ST-2 Base station power supply/charger (approx. 1 hr.)
- MS-1 13.8 VDC mobile stand/charger/power supply.
- VB-2530 2-M 25 W RF power amps., (TR-2500 only).
- TU-1 Programmable CTCSS encoder (TR-2500 only).
- TU-35B Programmable CTCSS encoder (mounts inside TR-3500 only).
- PB-25 400 mAH Ni-Cd batt.
- PB-25H Heavy-duty 490 mAH Ni-Cd battery pack.
- BT-1 Battery case for AA manganese/alkaline cells.
- SMC-25 Speaker microphone.
- LH-2 Deluxe leather case.

TR-3500

70 CM FM Handheld

- Covers 440-449.995 MHz in 5-kHz steps.
- Hi-1.5 W, Low-300 mW.
- TX OFFSET switch, ±5 kHz to ±9.995 MHz programmable.
- Auto/manual squelch control.
- Tone switch for opt. TU-35B
- Other outstanding features similar to TR-2500.

- BH-2A Belt hook.
- WS-1 Wrist strap.
- EP-1 Earphone.

TR-9130

All mode (FM/SSB/CW) 25 watts, plus...!!!

The TR-9130 is a powerful, yet compact, 25 watt FM/USB/LSB/CW transceiver. Available with a 16-key autopatch UP/DOWN microphone (MC-46), or a basic UP/DOWN microphone.

TR-9130 FEATURES:

- 25 Watts RF output on all modes, (FM/SSB/CW).
- FM/USB/LSB/CW all mode. Selectable tuning steps of 100-Hz, 1-kHz, 5-kHz, 10-kHz.
- Six memories. On FM, memories 1-5 for simplex or ±600 kHz offset, using OFFSET switch, Memory 6 for non-standard offset. All six memories may be simplex, any mode.
- Memory scan.
- Internal battery memory back-up, using 9 V Ni-Cd battery, (not KENWOOD supplied). Memories are retained approx. 24 hours, adequate for the typical move from base to mobile. External back-up terminal on the rear.
- Automatic band scan.
- Dual digital VFO's.
- Transmit frequency tuning while transmitting, for OSCAR operations.
- Squelch circuit for FM/SSB/CW.
- Repeater reverse switch.
- Tone switch.
- CW semi break-in; sidetone.
- Compact size and lightweight.
- Covers 143.9 to 148.9999 MHz.

TR-9500

70 CM SSB/CW/FM transceiver

- Covers 430-440 MHz, in steps of 100-Hz, 1-kHz, 5-kHz, 25-kHz or 1-MHz.
- CW-FM Hi−10 W, Low−1 W. SSB 10 W.
- Automatic band/memory scan. Search of selected 10-kHz segments on SSB/CW.
- 6 memory channels.

- HI/LOW power switch. 25 or 5 watts on FM or CW.
- High performance noise blanker
- RF gain control. • RIT circuit.

Optional accessories:

- KPS-7 Fixed station power supply.
- PS-20 Fixed station power supply (TR-9500 only).
- SP-120 External speaker.
- TK-1 AC adapter for memory back-up.

KENWOOD
TRIO-KENWOOD COMMUNICATIONS
1111 West Walnut, Compton, California 90220

Watts to see...

Big LCD, Big 45 W, Big 21 memories, compact.

TR-7950

Outstanding features providing maximum ease of operation include a large, easy-to-read (direct sunlight or dark) LCD display, 21 multi-function memories, automatic offset, programmable priority channel, memory and band scans, built-in lithium battery memory back-up, built-in 16-key autopatch, and a choice of a hefty 45 watts output (TR-7950), or 25 watts output (TR-7930).

TR-7950 FEATURES:

- **NEW, large, easy-to-read LCD digital display**
  Easy to read in direct sunlight or dark (back-lighted). Displays transmit/receive frequencies, memory channel, repeater offset, (+,S,–), sub-tone number (F-0, 1, 2, 3), tone, scan, and memory scan lock-out. Includes LED S/RF bar meter, and LED indicators for REVERSE, CENTER TUNING, PRIORITY, and ON AIR.
- **21 NEW, multi-function memory channels**
  Stores frequency, repeater offset, and optional sub-tone channels. Memories 1 through 15 for simplex or ± 600 kHz offset. Memory pairs 16/17, and 18/19 are paired for non-standard repeater offset. Memories "A" and "B" set upper and lower scan limits, or for simplex or ± 600 kHz offset. In MEMORY mode, a circle of light appears around the memory selector knob. When the memory selector knob is rotated in either direction to channel 1, an audible "beep" will sound.
- **Choice of 45 or 25 watts output**
  The TR-7950 provides a hefty 45 watts output, while the TR-7930 features a more modest 25 watts. A HI/LOW power switch allows power reduction to approx. 5 watts.
- **Long-life lithium battery memory back-up**
  Built-in lithium battery has an estimated 5 year life.
- **Automatic offset**
  The microprocessor is pre-programmed for simplex or ± 600 kHz offset, in accordance with the 2 meter band plan. "OS" key allows manual change in offset.
- **Programmable priority alert**
  The PRIORITY channel may be programmed in any of the 21 memories. With ALERT switch "ON," a dual "beep" sounds when a signal is present on the PRIORITY channel. An OPER switch allows an easy move to the PRIORITY channel.
- **Programmable memory scan lock-out**
  "LO" key for programming scan to skip selected memory channels, without erasing the memory.
- **Programmable band-scan width**
  The lower limit may be programmed into memory "A," and the upper limit into memory "B."
- **Center stop during band-scan, with indicator**
  Stops in center of channel during band-scan, with center tuning indicator.
- **Scan resume selectable**
  Scan stops on busy channel. Selectable automatic time resume-scan (approx. 5 sec., adjustable), or carrier operated resume-scan. A scan delay of approx. 1.5 seconds built-in.
- **Scan control using up/down microphone**
  Momentarily pressing UP or DOWN button on microphone tunes one step in the selected direction, on memory or on 5-kHz step tuning. Holding the button for about 2 seconds starts UP or DOWN automatic scan action. Scan start also possible using "SC" key on keyboard. Scan may be cancelled by momentarily pressing the PTT switch, or by pressing both UP/DOWN buttons simultaneously.
- **Programmable sub-tone channels**
  Optional TU-79 3 frequency sub-tone unit provides keyboard selectable sub-tone channels, which may be stored in memory.
- **Built-in 16-key autopatch, with monitor**
  The keyboard functions as a 16-key autopatch during transmit. DTMF tones appear in the speaker output when a key is pressed during transmit.
- **Front panel keyboard control**
  Used for selecting frequency, offset, programming memories, controlling scan, and autopatch encode. Keyboard lighting is provided.
- **Extended frequency coverage**
  Covers 142.000-148.995 MHz, in 5-kHz steps.
- **Repeater reverse switch**
  Locking-type switch, with indicator.
- **"Beeper" amplified through speaker**
- **Compact, lightweight design**
- **Easy-to-install adjustable-angle mobile mounting bracket**

Optional accessories:

- TU-79 3 frequency tone unit.
- KPS-12 fixed-station power supply for TR-7950.
- KPS-7 fixed-station power supply for TR-7930.
- SP-40 compact mobile speaker.

More information on the TR-7950 and TR-7930 is available from all authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220.

KENWOOD
...pacesetter in amateur radio

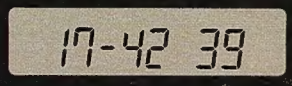
Specifications and prices are subject to change without notice or obligation.

ST-144/μP, 2 Meter FM

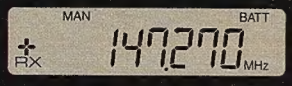
It's Time!

■ It's time you got your share of the excitement of full-feature synthesized handheld operations. ■ SANTEC{nology zaps to the lead of the state-of-the-art in 2 meter handhelds with the new ST-144/μP. ■ Only SANTEC hands you all the up-to-the-minute features of this "clockwise" precision jewel.

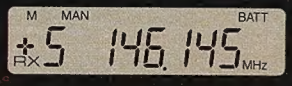
■ The 24 hour format digital clock on the LCD display is uniquely SANTEC, and it typifies the thoughtful operator-oriented design incorporated throughout the ST-144/μP. ■ Not only does it give you accurate time checks whenever you want, but also it can display the time instead of the frequency, while this handful of radio continues to operate on your "favorite" frequency.



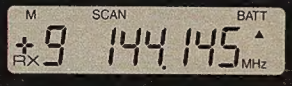
24 Hr Clock provides time of day even while the radio is turned off, or it can be selected by the front panel switch while in QSO.



Full Frequency Display showing offset selected, battery condition and current scan mode. At turnon, the contents of M-1 are loaded into the operating register, and the display looks like this.



The Memory Mode is indicated by the small "M" above "+". the "5" indicates that the data were stored in Memory 5 before recall. The "+" indicates that the + offset was stored with the frequency.



Memory Scan with "Priority Scan/Auto-Resume" has stopped on Memory 9 to listen for a few seconds.

Transmit is indicated on a minus 600 kHz offset from 146.820 MHz which was stored in M-6. Activity on Memory 6 was found by using the "Search" mode of Scan.

■ The 10 frequencies that you put into the memories are stored with your repeater offsets, and you can have them scanned, searched or instantly recalled at the touch of a button. ■ Memory 1 even gets priority treatment in the memory scan mode. ■ That's timely complexity made amazingly simple: and the high power option of 3.5W (nominal) is simply the greatest reach you've ever held in your hand.

■ "Battery saver" function by the computer to hoard battery power when the frequency is quiet ■ Programmed limits for both ends of bandscan ■ Simplified frequency entry only by keyboard ■ Full capacity, low impedance audio output to drive an external speaker ■ Wide band span for MARS, CAP, AF MARS: 142.00-149.995 MHz ■ Quick-change 500mAh battery ■ Separate level controls for MIC, TT, PL and DEV ■ & so much more that we don't have space to mention ■ SANTEC hands it all over, while others can't even give you the time of day.

All stated specifications are subject to change without notice or obligation.

Accessories for SANTEC Handheld Radios
clockwise from upper left:
- **Leather Case (ST-LC)**
- **Base Charger & Power Supply (ST-5BC)**
- **Remote Speaker (MS-50S)**
- **Mobile Charger (ST-MC)**
- **Speaker Microphone (SM-1)**

Sale of the ST-144/μP is subject to FCC certification: approval and availability expected January, 1982.

SANTEC

2000 Avenue G, Suite 800, Plano, Texas 75074
Phone (214) 423-0024 • INTL TLX 203920 ENCOM UR

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2000 Avenue G
Suite 800
Plano TX 75074

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CQ The Radio Amateur's Journal

ON THE COVER: No, the camera didn't move. It's just Trey Garlough, WN4KKN, practicing all of the skills needed to be a successful contester. Trey shows just how fast you have to be. Thanks to the camera artistry of Joe Veras, N4QB, we could capture this moment on film.

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Zero Bias

AN EDITORIAL

The National Convention in Cedar Rapids this past July turned out to have some rather unique side benefits attached to it. Jack and I got to fly on an airplane that we had never heard of before and on a plane that we had never seen before. We did share the experience with some of the folks from the League as we flew from Chicago to Cedar Rapids. Most important, the weather and the prevailing winds were in our favor all weekend. The weather was perfect for a hamfest and the local winds were calm. This was a boon to out-of-towners like ourselves, as Cedar Rapids has a meat-packing plant on one side of town and the Quaker Oats Company on the other, so depending on which way the wind blows, you're sure to notice local industry.

The Convention started Friday evening with the exhibit hall open from 6:00 to 10:00 p.m. There were a large number of commercial exhibitors present, so everyone had lots to look at, plenty of dials to twist, and literature to pick up. There was a steady flow of hams (and non-hams) through the hall over the three-day period, and by Saturday evening we were out of magazines and most of the books we brought. I did manage to make a few passes through the flea market, but came up empty. The elusive bargain wasn't there for me. One of the exhibitors did have a good deal on hardware, and as I was buying some, Al Caplan, W0RIC, the new Sales Manager for Hy-Gain, passed by and asked one of the unkindest questions one ham can ask another. He said, "I see you at all these conventions and you're always buying stuff; what are you going to do with it?" Al obviously is not your typical amateur pack-rat who recognizes what most of us do: that a bargain is a bargain, and the widget will come in handy one day.

I got my picture taken with Paul DiNapoli, WD8AHO, as I passed the Encon booth. Paul and his brother Pete market a line of exotic solar panels and equipment which they are expanding to the amateur market. We're working on a review of their panels at this writing so that we can give you a report. Solar-powered repeaters and stations are no longer just a novelty. They work for a lot of people.

Jack and I flew back to New York on Sunday evening. The following Thursday I was off again, heading towards the Flagstaff, Arizona Hamfest. The plane blew a tire on landing in Phoenix, and that's always an interesting experience. I know that it is an infrequent occurrence, that the crews are well trained, and that the situation wasn't really that dangerous, but it does give you an exciting moment or two. I had a couple of hours in between my arrival in Phoenix and my flight to Flagstaff, so there was just enough time for Terry Dillahunty, K0UK (he's also HH2TD), of Signal/One to pick me up at the airport and drive me out to where they make the Milspec 1030. Don Roehrs, WA2SAB, gave me the quick tour (we were working against the clock), and then after an even quicker lunch I was on my way back to the airport for the flight up to Flagstaff.

Contrary to my belief that Arizona is strictly desert country, let me tell you that there are some of the most beautiful mountain ranges to be seen in Arizona. Another small airline and an even smaller plane flying low through a summer storm gives you a spectacular perspective of the terrain. Flagstaff is up in the mountains not far from the Grand Canyon, and most importantly, it is a lot cooler than Phoenix. There are forests, mountains, and a lot of clear, clean sky to admire and appreciate. Lew McCoy, W1ICP, met me at the airport, and we went right to the Hamfest site (Fort Tuthill) to check it out and to see if any of the flea market people were setting up early (they were).

Lew drove up from New Mexico with his wife, Martha, and the three of us were at the *CQ* booth. Lew was also a speaker at one of the forums on Saturday afternoon, and Martha had been invited to be one of the judges at the Saturday evening dinner/dessert contest. It was a great four days—almost like a mini-vacation. There was a picnic-type dinner on Saturday night where roast beef and ham which had been cooked on a solar cooker were served (tender and juicy). As I mentioned earlier, solar power was in evidence, as several of the motor homes had solar panels for the amateur gear. There were plenty of bargains at the flea market, and I filled up the recesses of my suitcase with some terrific stuff. I even met some transplanted New Yorkers who I hadn't seen in a long time. (After seeing Arizona, I know why.)

A few days after I came home from Flagstaff, Dick left to cover a Hamfest in Maine. Besides giving me time to work on this issue, it gave me a free weekend for the big project!

The Big Project

Well, antenna fans, those neighbors of mine who didn't know that I was a ham no longer have any doubt. It's up! Starting at about 8:00 a.m. last Saturday morning, Woody, K2UU, and I, joined a little later by Jack, W2LZX, managed to get the tower on the roof, assemble and install the TH5DX plus the 2 meter Boomer, and run the cables. Everything seemed to work out exactly. Nothing was missing in the way of hardware, and it went together in just about 8 hours. The only thing that was missing was the person to take the pictures. We were all too busy working. The next stage is the grounding system and the pictures, plus a write-up on the project.

73, Alan, K2EEK

KV4AA Silent Key

The world-renown call King Victor 4 Able Able is no more. Richard, "Dick" Spenceley, KV4AA, became a Silent Key, succumbing to a massive heart attack at 0800Z on July 30th. He was 77 years old.

Dick had been a resident of the Virgin Islands for over 55 years, starting as K4AAN in 1927 and retaining the call KV4AA from 1941 to date. He was a member of the FOC and QCWA and one of the early stations to make DXCC and WAZ. In 1969 he was the fourth person to be elected to *CQ's* DX Hall of Fame.

As DX editor of *CQ* from 1951 to 1959, he created the WPX program. He was also one of the founders of the YASME Foundation, acting as its President from 1959 to 1965. He was instrumental in getting Danny Weil started as VP2VB on the first of many world-wide DXpeditions sponsored by YASME.

His last project was to get amateur radio into the *Guiness Book of World Records.* His claim of 195,000 contacts in a six-year period from (1976–1981) is now being considered. It would be a fitting reward for his 55 years of devoted service to amateur radio.

The real beauty of the Collins KWM-380 is behind the panel, not on it.

At Collins, we know serious amateurs won't settle for less than professional performance. So we build every KWM-380 to commercial rather than amateur standards. For example, our PC boards are connected by ribbon cables with gold-plated pinfield connectors. The boards themselves are all glass epoxy, and virtually unaffected by temperature and humidity which cause intermittents in the more commonly used phenolic boards.

Once built, every KWM-380 undergoes 24-hour burn-in, then is aligned and tested to meet or exceed every spec on the data sheet. Which makes us very confident about warranting your KWM-380 for one full year.

The result is a radio with superior performance and lasting quality, not front-panel glitter. Frequency stability is just one example of its beauty: typically, drift is as low as 10-12 Hz per hour for normal ham shack environments. Other companies haven't matched our performance because they don't match our quality behind the panel.

Add some real beauty to your station. See the KWM-380 at your nearest authorized dealer. Collins Telecommunications Products Division, Defense Electronics Operations, Rockwell International, Cedar Rapids, IA 52498. Phone (319) 395-5963. Telex: 464-435.

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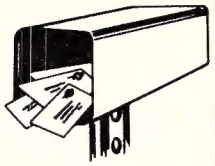
...where science gets down to business

CIRCLE 50 ON READER SERVICE CARD

Our Readers Say



More S.W.L. Articles

Editor, *CQ:*

First let me say how much I enjoy your fine magazine. I almost devour the Novice, QRP, World of Video, Propagation, and Antenna columns between the mailbox and my front door! Your special-topic issues are a wealth of knowledge to *all,* not just hams alone.

I say all, because hams are not the only ones to value this information. As a long-time s.w.l. (32 years) and a short-time ham (Novice, May this year), I feel the one column your magazine lacks is an s.w.l. column! Bill Welsh's Novice Column series on s.w.l.'ing is but one fine example of what you have to offer the s.w.l. and/or ham. Past s.w.l. letters, including non-ham subscriber comments, attest to this fact. A steady monthly diet of the caliber you are now printing on the subject would be good for both parties—the s.w.l. and your circulation! I for one intend to continue to enjoy both aspects of my hobby, one which is an old friend and the other, a new birth, one that was planned and now is relished!

Thomas B. Henchy, KA7NDH
Murray, UT

Let's Hear It For QRP!

Editor, *CQ:*

I am writing to express my appreciation for the QRP coverage in the June 1982 issue. It is my impression as a beginning ham that low-power operation is a healthy movement in amateur radio. My enjoyment and success as a Novice using an HW-8 has provided for me: (1) the proof of the possibility of QRP success for a beginner (though, admittedly, several years of listening preceded the license), and (2) the incentive to upgrade to obtain wider frequency range (I just padded the General exam).

So, I have certainly appreciated the QRP coverage in the June issue and the articles by Adrian Weiss and would like to encourage their continuation.

Dan Smelser, KA4WHV
Vidalia, GA

A "Super" Antenna Issue

Editor, *CQ:*

Thanks much for your "super" antenna issue *(August 1982)*! Being new in amateur radio, I was impressed with the quality of the articles and how informative they were.

I have been licensed for four months—seven weeks as a Novice and now General class. I have been curious about long-wire antennas for awhile now, and the article by Philip Rand, W1DBM *("Long Wire Antennas, page 13)* helped answer a lot of questions. But the article on open-wire feed lines by Lew McCoy, W1ICP *(page 40)* really opened my eyes. I had been told so many different things about this, that I didn't know what to think. Now that I understand the subject better, my choices will be easier to make. I am using ½-wave dipoles now, and I am not satisfied that they are giving me the performance I desire. Thanks again for a great magazine!

Michael Schrowang, KA9NGZ
Granville, IL

Crosby Info, Anyone?

Editor, *CQ:*

Tnx for the reminder that my subscription was about to run out. You're right. I wouldn't want to miss an issue, and you're also right that I keep every issue for reference. *CQ* has found the correct formula for the right balance of articles on construction, contests, historical and new techniques, etc., to make it the best.

Like most hams, I am a "goodie" collector, and a few years back I acquired a surplus, commercial 100-watt Crosby transmitter/receiver. It tunes from 1.5 to 7.5 MHz, and I would like to use it on the low amateur bands.

The s.s.b. transmitter type 161B and the receiver type 166 were built by the Crosby Co. of Hicksville, NY, for the Hudson Bay Co., who used it across northern Canada to link their stores and trading posts. From what I can remember, Dr. Crosby was an electronics genius who, among other things, invented a method of f.m. stereo that now appears to have been superior to the RCA system that was chosen for the industry standard.

Dr. Crosby has since died, and it appears that the company is no longer in business. I was wondering if you could make a few local calls to the Crosby's still living in Hicksville to find out if there is a source I can contact for the manuals and schematics. Your help would be very much appreciated.

George J. Devin, VE6BGJ
Edmonton, Alberta, Canada

(Phone calls to the Crosby's still in Hicksville proved fruitless. Any readers out there who can help?—ed.)

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● **10 Meter Dungeons and Dragons Net** - This new net is on the air at 28.720 (also check 28.820) ± QRM Saturdays at 1500 GMT. Be ready with all necessary info. Net control is KA9JOX. If you wish to participate regularly, contact Michael Frost, KA9JOX, Box 1008, Riverside, IL 60546.

● **Smith-Kettlewell Technical File** - This periodical for the visually handicapped interested in current technology is now available in braille, on cassette, and in large print. It is aimed at those hobbyists, students, and professionals interested in construction techniques, IC pin diagrams, test equipment adaptations, and more. There is a subscription fee to cover production costs, as this is a non-profit organization. For a sample issue contact Editor, William A. Gerrey, Smith-Kettlewell Institute of Visual Sciences, 2232 Webster St., San Francisco, CA 94115, or phone 415-561-1619.

● **Bill Gremillion Memorial Radio Club** - The club will operate K4SEX on Saturday, October 2, for county hunters (Heard County, GA). Frequencies: General class portion of phone bands on 10, 15, 20, 40, and 80 meters. C.w. available. S.a.s.e. for confirmation to Bill Gremillion Memorial Radio Club, P.O. Box 2327, Newnan, GA 30264.

● **W2GSA Special Event** - The Garden State ARA, call W2GSA, will hold the Treasure Island DXpedition, Monmouth County, NJ, to commemorate the stay of Robert Lewis Stevenson on the island. It will be held from 1400 GMT October 2 to 1400 GMT October 3 on 3.535 and 14.035 c.w., and 3.900, 7.235, 21.375, and 28.725 s.s.b. For a QSL/certificate send $1.00 to Lou Eloe, WA2SSH, 7 Carol Ave., Neptune, NJ 07753.

● **Coosa Valley ARC From Rome, GA** - This club will operate to commemorate Heritage Holidays from 1200Z October 9 to 2200Z October 17, 25 kHz on the lower side of the General class phone band 80 through 10 meters. Special certificate for large s.a.s.e. Endorsement for Wagon Train mobile on October 16 to CVARC, Box 183, Rome, GA 30161. *(No call given.)*

● **Argonne ARC to operate W9QVE** - Two stations will operate on October 9–10 from 1500–2300 GMT to commemorate the first controlled nuclear chain reaction experiment. Frequencies: s.s.b.—3985, 7285, 14285, 21285, 28585 kHz; c.w.—3545, 7045, 14045, 21045, 28045, 3765, 7165 kHz; Novice band 21165 kHz; RTTY 14090 kHz and 146.70 MHz; plus 2 meter 145.19/144.59 MHz repeater, and 146.52 and 147.42 MHz simplex. Send business-size s.a.s.e. or $1.00 for certificate to AARC, P.O. Box 275, Argonne, IL 60439.

● **WD4KOW from Sunbelt Agricultural Exposition** - This Colquitt County Ham Radio Society will operate on October 12–13 from 0900–1700 EDST each day using the call WD4KOW. Operations will be in the General portions of the h.f. bands, plus repeater on 146.19/79. A special QSL card is available for an s.a.s.e. For more information, contact Joel Goings, AA4P, CC Ham Radio Society, P.O. Box 813, Moultrie, GA 31768.

● **Moscow, MI, DXpedition** - The Hillsdale County Radio Amateurs Assoc. will hold their second annual Moscow DXpedition to Moscow, MI, from 1700Z October 16 to 1700Z October 17 under the call WB8HIZ. Frequencies: 3.940, 7.260, 14.285, 21.360, 50,120, 52.525, 144.310, 146.57 MHz. Exchange will be signal report, name, and QTH (except Moscow station—serial number). All QSL's with an s.a.s.e. will receive a certificate. Send to Ham, P.O. Box 206, Moscow, MI 49257.

● **Madison County ARC Hidden Transmitter Hunt** - This event will be held on October 17. Starting point will be Mounds State Park, Anderson, IN. Prizes will be awarded. Contact: Frank Dick, WA9JWL, 921 Isabelle Dr., Anderson, IN 46013, phone 317-642-1237.

● **Mount Sunflower DXpedition** - KØEQH will operate from the highest point in Kansas in Wallace County on October 23–24 from 1700Z on the 23rd to 1700Z on the 24th on s.s.b., c.w., RTTY, and f.m. from 160 through 2 meters. To set up skeds, contact the Western Kansas DX Society, P.O. Box 811, Garden City, KS 67846. S.a.s.e. for commemorative QSL.

● **Special Events Station W3WP** - W3WP will operate for 24 hours on October 24 from Penn's Landing, Philadelphia, PA, to celebrate the birthday of William Penn. Exchange: RS(T), city, state, country, and W3WP log number. Frequencies: phone—3.925, 7.275, 14.290, 21.365, 28.550 ± QRM.; c.w. just inside high end of each band; also repeater 146.685/.085. S.a.s.e. for QSL to Harry White, N3HW, 7520 Verree Raod, Philadelphia, PA 19111.

● **The following hamfests, etc. are slated for October:**

Oct. 1–3, **ARRL West Gulf Div. Convention/Houston Com-Vention 82,** Houston, TX. Contact Houston Com-Vention 82, P.O. Box 79252, Houston, TX 77279; call 713-481-4586.

Oct. 2, **Pack Rats Hamarama 82,** Warrington, PA. Contact Hamarama 82, P.O. Box 311, Southampton, PA 18966, or call K3MXM at 215-635-4942.

Oct. 2, **RAGS Hamfest,** Syracuse, NY. Contact Ed Swiatlowski, 5 Colony Circle, Camillus,NY 13031.

Oct. 3, **31st Annual Rock Hill Hamfest,** Rock Hill, SC. Contact YCARS, Box 4141 CRS, Rock Hill, SC 29730.

Oct. 3, **RA-COM 82,** Mt. Prospect, IL. Contact RA-COM, P.O. Box 89, Mt. Prospect, IL 60056 (s.a.s.e.).

Oct. 3, **1982 Rome Hamfest,** Rome, GA. Contact Buddy Waller, NO4U, 18 London Lane SE, Rome, GA 30161.

Oct. 3, **San Angelo Amateur Radio Swapfest,** San Angelo, TX. Contact Mark Haskell, Rt. 3 Box 92, San Angelo, TX 76903.

Oct. 8–10, **1982 Pacific Division Convention,** Santa Cruz, CA. Contact SCCARC Convention, P.O. Box 238, Santa Cruz, CA 95061; call 408-426-6691.

Oct. 9, **Headwaters ARC Hamfest,** Park Rapids, MN. Contact Ed Delahunt, KØGUV, RR 3, Park Rapids, MN 56470.

Oct. 9, **Western North Carolina Autumnfest,** Leicester, NC. Contact Robert Sawinski, RR 2 Box 267A, Leicester, NC 28748.

Oct. 9–10, **ARRL Virginia State Convention & Tidewater Computer Show,** Virginia Beach, VA. Contact Jim Harrison, N4NV, 1234 Little Bay Ave., Norfolk, VA 23503; call 804-587-1695.

Oct. 10, **Columbia ARA Hamfest,** Columbia, MD. Contact Sue Crawford, 6880 Mink Hollow Road, Highland, MD 20777.

Oct. 10, **CMARC Ham-Fair 82,** Grand Ledge, MI. Contact Ham-Fair 82, P.O. Box 10073, Lansing, MI 48910; call 517-626-2237.

Oct. 10, **21st Annual Hoosier Hills Hamfest,** Bedford, IN. Contact Dick Reistter, KA9JTZ, Hoosier Hills Ham Club, Box 891, Bedford, IN 47421.

Oct. 16–17, **Amacom 82,** Delgado Community College, City Park, LA. Contact Bill Bushnell, WA5MJM, c/o Jefferson ARC, P.O. Box 73665, Metairie, LA 70033; call 504-887-5022.

Oct. 17, **DXPO 82,** Washington, D.C. area. Contact W3UJ, 11803 Enid Dr., Potomac, MD 20854.

Oct. 23–24, **Hamfest Chattanooga 82,** Chattanooga, TN. Contact Hamfest Chattanooga, P.O. Box 3377, Chattanooga, TN 37404.

Oct. 30–31, **1982 ARRL Hudson Div. Convention,** Great Gorge, NJ. Contact HARC Convention, P.O. Box 528, Englewood, NJ 07631 (s.a.s.e.).

Oct. 31, **Heart of Ohio Ham Fiesta,** Marion, OH. Contact Paul Kilzer, W8GAX, 393 Pole Lane Road, Marion, OH 43302.

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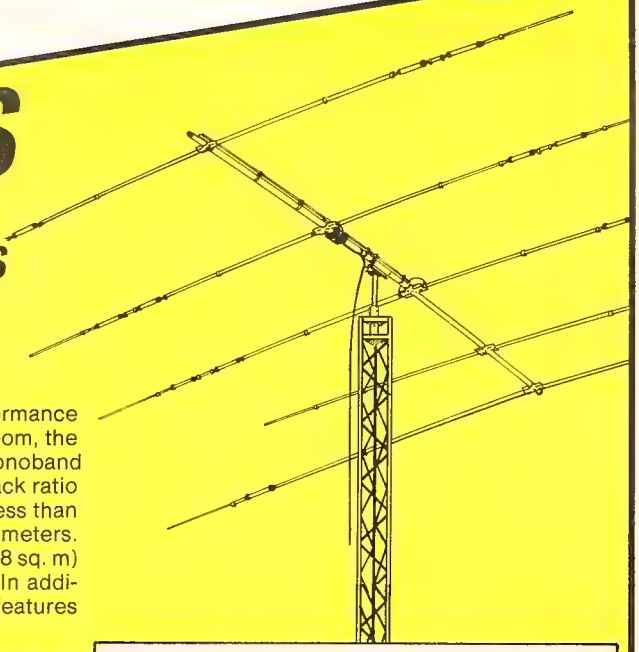

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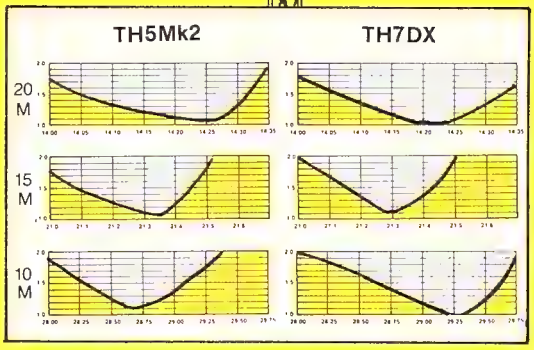

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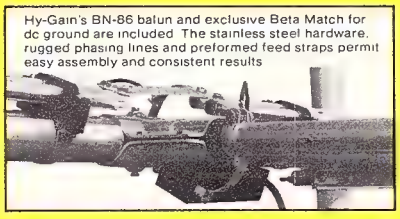

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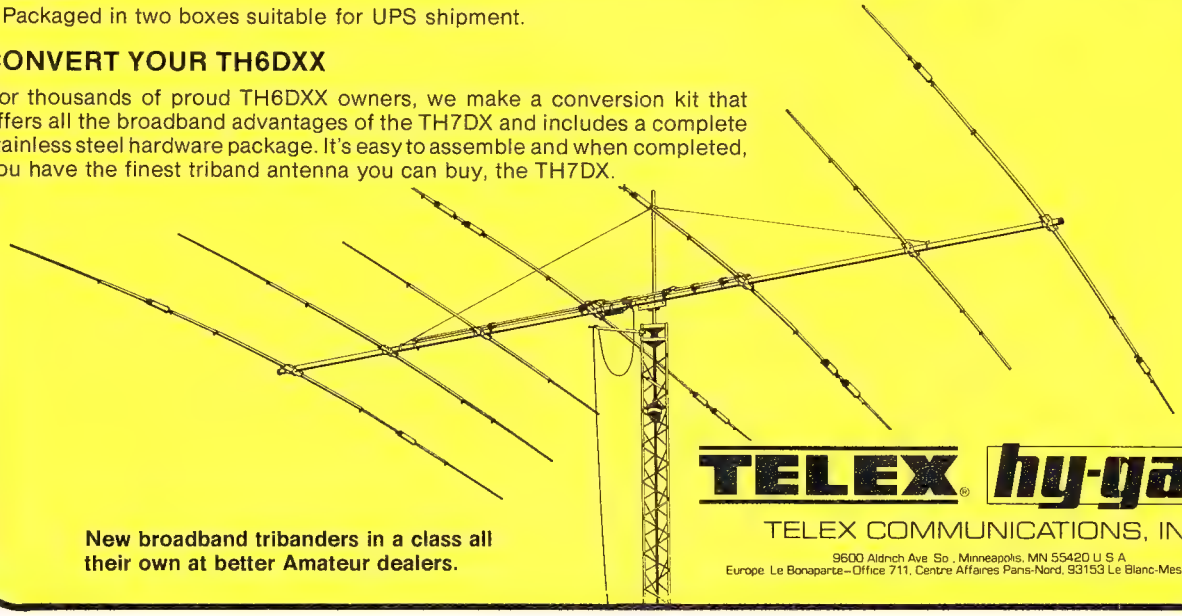

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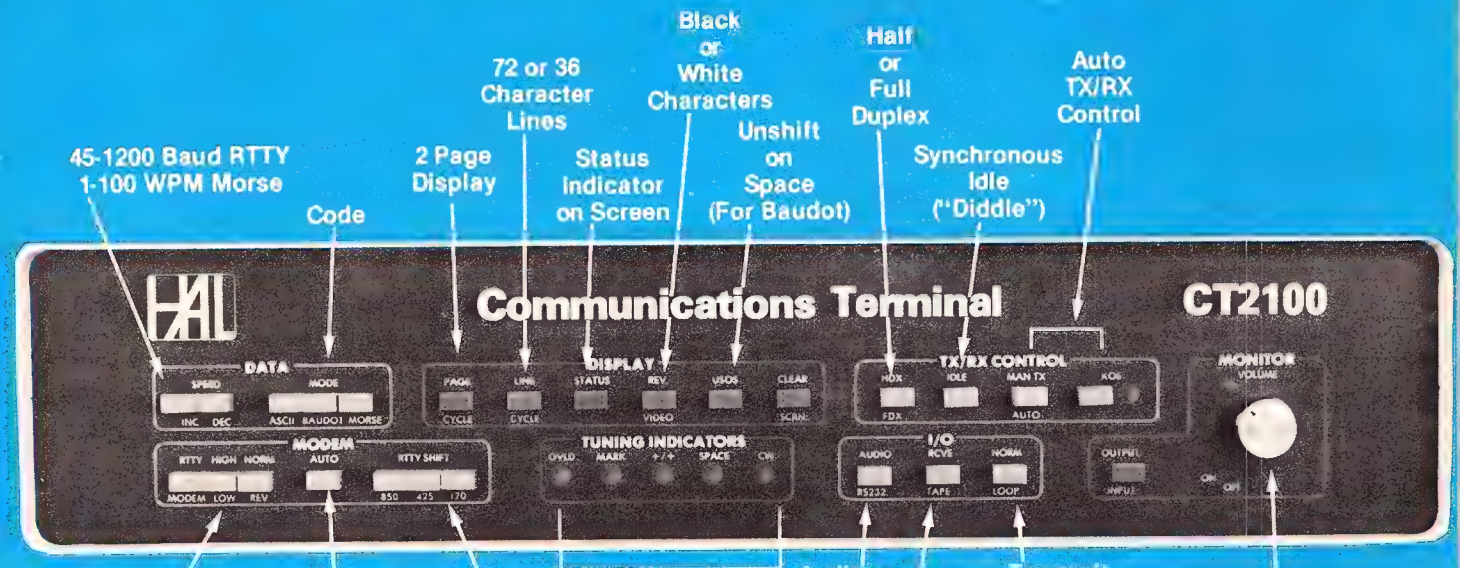

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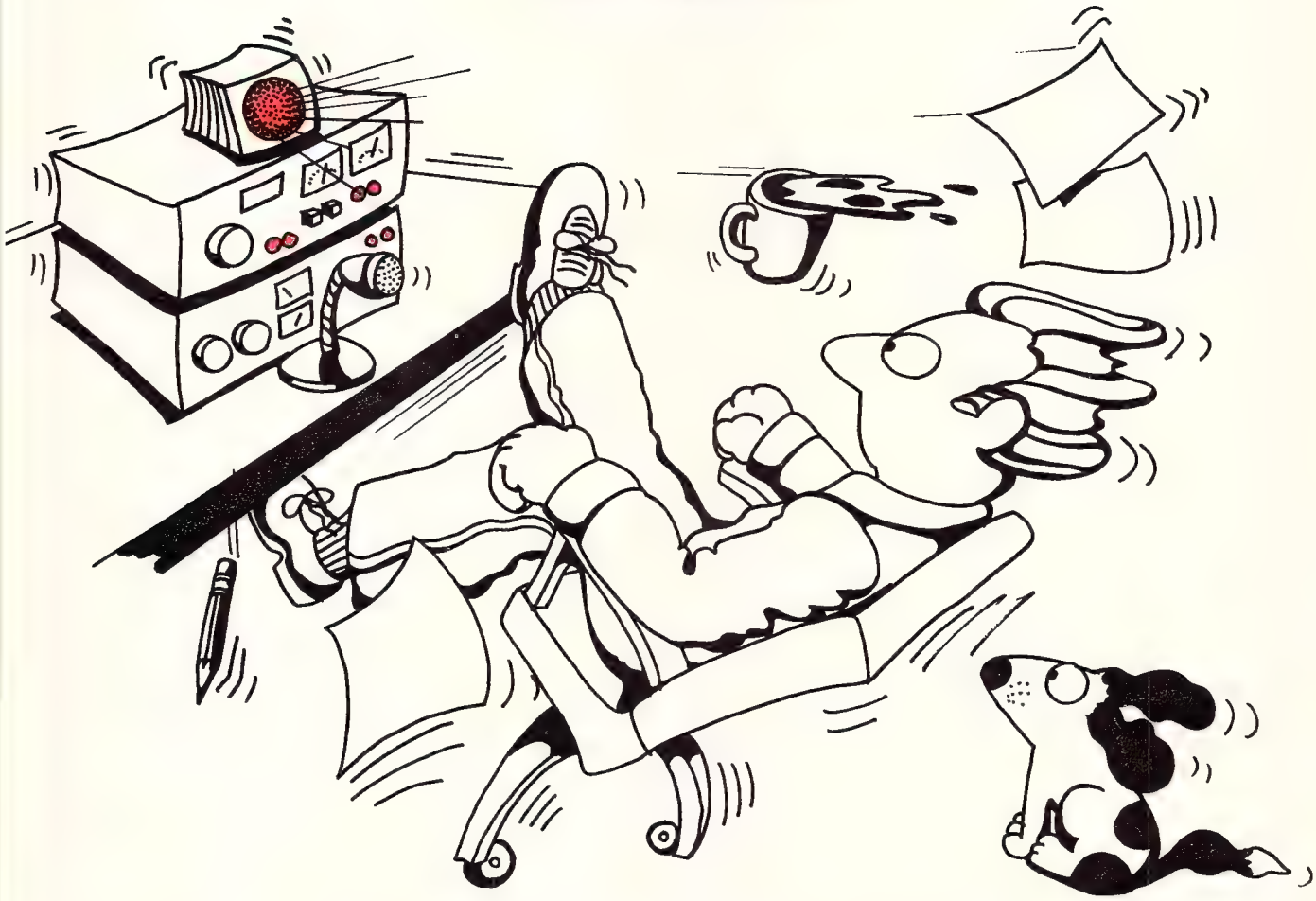

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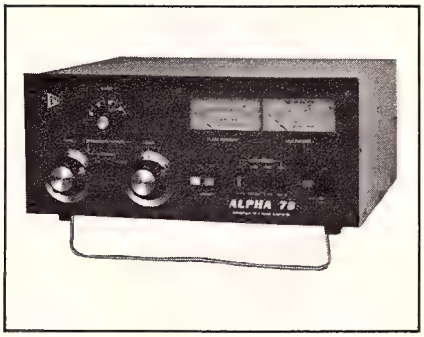

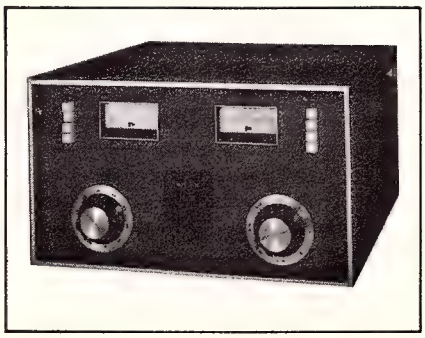

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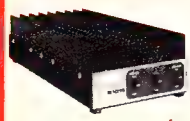

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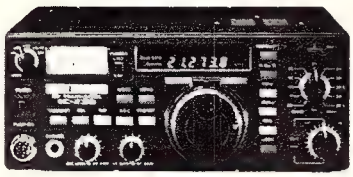

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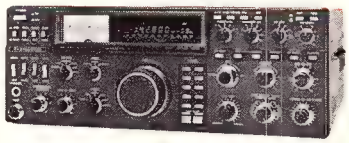

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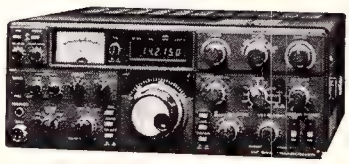

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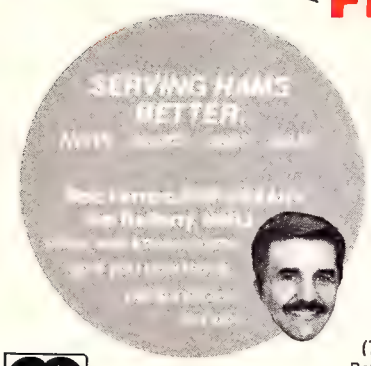

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CQ Interviews:

Mr. Wendell H. Bailey KC3BU

Vice President Science and Technology Dept. National Cable Television Assoc. Washington, D.C.

BY DR. THEODORE J. COHEN, N4XX

Wendell H. Bailey is Vice President of the Science and Technology Department of the National Cable Television Association (NCTA). He has held this position since April 1981.

Prior to joining NCTA, Mr. Bailey spent eight years at MCI Telecommunication Corporation in Washington, D.C. Here, he held a variety of positions including circuit engineer, senior engineer, and manager of operations. He also served as the Manager of Engineering, Planning, and Coordination for the five years prior to joining NCTA. Before joining MCI, Mr. Bailey spent seven years at AT&T where he specialized in private-line communications, radio, and switching systems.

A native of Kentucky, Mr. Bailey has lived most of his life in the Washington, D.C. area. He is a graduate of the University of Maryland, and is an active amateur radio operator (KC3BU). Wendell, his wife, and daughter live in Fort Washington, MD.

It is with great pleasure that CQ now presents its exclusive interview with Mr. Bailey on the vexing problem of cable television interference.

CQ: Wendell, what is the nature of the cable television interference (CATVI) problem?
Bailey: Simply put, CATVI is interference that hams may experience from a cable television system. The interference is the result of faults in the system, such as loose connectors. If these faults occur in close proximity to amateur stations operating on the 2-meter band, enough of the TV signal may leak out and cause sensitive receiving gear to react.

CQ: But isn't a leaky cable system a "two-way street"?
Bailey: Oh, yes! The same faults that permit TV signals to leak out also provide paths for signals to enter a cable system. Therefore, a ham who operates his or her rig in a perfectly legal manner can get into a leaky cable system and disrupt service on certain channels. Such a disruption in service is not the ham's fault, and the FCC Rules lay the responsibility to "tighten up" such a system against these occurrences with the cable system operator.

CQ: How is the interference characterized in each case?
Bailey: To hams, the interference most frequently takes the form of a squelch break or a steady carrier on 145.25 MHz. To the cable system viewer, the problem may vary from mild interference to complete picture distortion on a specific cable channel.

CQ: Do the cable industry and the amateur community consider CATVI to be a serious problem?
Bailey: Yes! Hams have a long history of fighting for the right to use their frequency bands unmolested by interlopers. The cable industry, on the other hand, has to use an expanded set of channels in order to meet the programming requirements laid on them by franchising authorities. Loss of frequency use by either or both parties, therefore, is considered to be a very serious matter.

CQ: Just what are the r.f. leakage standards imposed by the FCC?
Bailey: The leakage standard germaine to this issue is: Thou shalt not leak a signal of more than 20 microvolts-per-meter measured at 10 feet.

CQ: But aren't new standards being proposed which are less stringent?
Bailey: Yes, but not without good reason. Currently, the FCC has a docket under consideration *(Docket 21006—ed.)* which addresses signal leakage levels for cable systems. This docket is concerned, in particular, with the problem of potential interference to communications on the FAA's aeronautical frequencies. As part of the inquiry, a long and exhausting research project was sponsored by the FCC to characterize this type of interference. Participating in the study were representatives of the FAA, NTIA *(National Telecommunication and Information Agency—ed.)*, NCTA, and other groups.

*8603 Conover Place, Alexandria, VA 22308

CQ: What, specifically, was the result of the study?
Bailey: The net result was a recommendation to relax the signal leakage rules, with the levels suggested in the range 50 to 100 microvolts-per-meter at 10 feet. I would like to point out that relaxation of the radiation standards is being recommended only after a very thorough analysis into the facts of this particular problem. No such effort has yet been undertaken in the matter of interference to and from amateur communications. However, the NCTA Engineering Committee has recommended that this type of study be initiated as soon as possible.

CQ: Legal actions by amateurs in several parts of the country have apparently been taken to force a number of cable operators off cable channels E and K *(145.25 MHz and 223.25 MHz, respectively—ed.)*. Would you comment on this?
Bailey: Ted, I've heard rumors to this effect, but to date, I have seen only one report about a cable system losing the use of a channel in this way. According to the report, the system did not comply with the FCC standards on leakage, and the system's operator was unwilling even to make an attempt to comply. If this is really true, the FCC Rules are clear: this operator cannot use the channel in question until he is willing to comply with the FCC Rules.

The NCTA is working on a joint engineering committee which was formed to research the CATVI problem as it involves the amateur service.

CQ: What steps has the NCTA taken, and what steps do you plan to take, to eliminate CATVI problems?
Bailey: The major step taken by the NCTA is to offer to work with the ARRL in order to educate both the cable industry and the amateur community as to the nature of CATVI problems and ways in which our two groups can live together. In this regard, we are working to establish liaison with the ARRL. Further, the NCTA is working on an engineering committee to research the CATVI problem as it affects the amateur service.

CQ: Wendell, what specifically has the NCTA done to educate cable operators about CATVI as it affects the amateur?
Bailey: The NCTA has recently reprinted several articles on CATVI from *QST* as part of a special message on the subject from NCTA's Office of Science and Technology to cable operators around the country. This material appeared in the June issue of our journal, *Techline*. This issue was sent to every member of NCTA and to every member of the Society of Cable Television Engineers. In addition, 500 copies were distributed by CATA *(Community Antenna Television Association—ed.)* at their annual convention. All together, some 10,700 copies were mailed or distributed, making this the largest circulation of any NCTA document ever.

We have developed a procedure to assist in resolving individual CATVI complaints at the local level.

CQ: But what about CATVI complaints? What is being done to resolve them?
Bailey: We have developed a procedure to assist in resolving individual CATVI complaints at the local level. In particular, the ARRL has developed a questionnaire which will be completed by the amateur who receives a CATVI complaint, by the League, or by the NCTA, as the case may be. The form is designed to determine if the most effective steps have been taken to eliminate the problem. If not, methods which most likely will lead to an amicable solution are recommended.

CQ: But what if the problem still remains?
Bailey: The reporting procedure allows for referrals of complaints to the NCTA liaison office headed by Mr. Robert Dickinson, W2CCE. He will contact the cable system operators in order to determine how the problem can be resolved. If Mr. Dickinson's efforts are unsuccessful, the problem will be referred directly to NCTA for follow-up. We will then contact the owners and/or operators of the system in question and will make every effort to work out a solution.

CQ: How effective have you been in resolving CATVI problems in this manner?
Bailey: Ted, it is too early to claim a great deal of success. However, by the time this interview is published, I hope we can report that the overall CATVI problem is diminishing as a result of our efforts.

CQ: How do you feel about regulatory solutions to CATVI?
Bailey: I think that both the NCTA and the ARRL believe CATVI problems can best be resolved through sincere cooperation between the cable operators and the amateur community. Regulatory involvement can lead to delays and animosity between these two groups, both of whom have a stake in the success or failure of each other's service.

CQ: What do you mean by your last statement?
Bailey: Well, hams have much to gain from the successful operation of a cable television system in their community. As for the cable industry, we are hungry for technicians and engineers, and we look to the amateur community for well-trained and interested people.

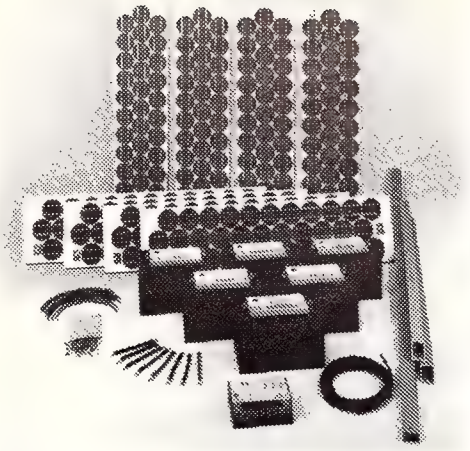
Amateurs should work with the chief engineer of the cable system involved to pinpoint problems and to effect solutions.

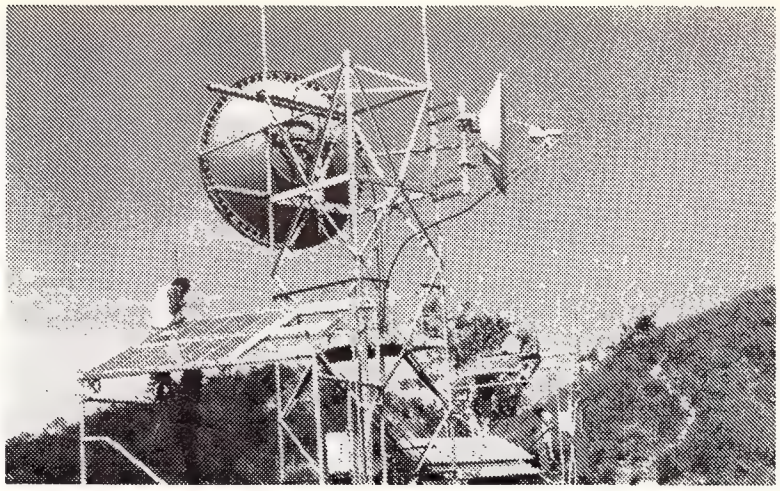
CQ: Is there anything amateurs can do to resolve CATVI problems at the local level before contacting the ARRL?
Bailey: Yes, there is, Ted. Amateurs should work with the chief engineer of the cable system involved to pinpoint problems and to effect solutions. This effort should be undertaken in a friendly manner by both parties. If success is not achieved, the ham should then call the ARRL and should be prepared to explain what steps have been taken. The established procedures I just mentioned will then be put into effect, and if necessary, the NCTA will become involved.

We can all live together if we cooperate instead of fight. I am confident that the first steps towards . . . coexistence have been taken.

CQ: Wendell, one last question. Do you think the cable television industry can coexist with amateurs on cable channels E and K?
Bailey: We can all live together if we cooperate instead of fight. I am confident that the first steps towards this type of coexistence have been taken.

CQ: Thank you very much for this enlightening view of your Association's activities.
Bailey: I appreciate having had the opportunity to discuss our work in *CQ*!





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CIRCLE 37 ON READER SERVICE CARD

With the CQ WW DX C.W. Contest coming up, here is one way to improve your chances.

Civilizing The AEA CK-1 Contest Keyer

A Few Ideas on Improving a Popular and Versatile Keyer

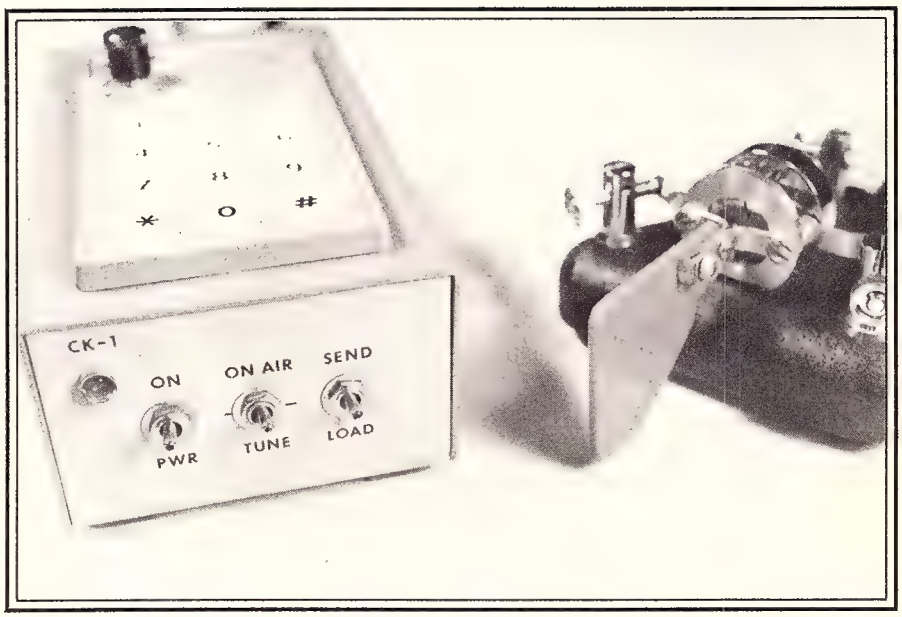
BY STEPHEN E. RUSSELL*, WØOGJ

The mark of success or longevity in a product line in the amateur radio industry is when a product is held onto by its owner and modified to make it even better. WØOGJ reworked his AEA CK-1 Contest Keyer to do just that—make it better.
—K2EEK

My passion is c.w., and electronic keyers. While I prefer to build them, occasionally a commercial keyer comes along with features too fantastic to resist. Such was the case with the CK-1 Contest Keyer. When AEA announced the CK-1 with features such as 10 memories, 500-character memory capacity, digitally selected speed from 1 to 99 w.p.m., pre-set speeds, automatic serial-number generator, dot and dash memory, weighting, etc., I had to have one.

I found the CK-1's microprocessor circuit amazingly flexible. However, the keyer is designed somewhat unconventionally and has a few features that didn't fit well with my existing station. Specifically, I didn't care for the connectors (DIN jack for paddle input, RCA phono jack for keying output) and the location of the **Send/Load** switch, which is positioned on the left side at the rear and is not labeled as to which position is which. The audio from the small internal speaker leaves something to be desired. In addition, it requires an external a.c. adapter, and even with rubber feet I found the keyer slid around the desk because of its light weight.

By repackaging the keyer I was able to correct the features I found annoying, and in the process add a few features not found in the original keyer. The repackaged keyer includes: (1) a larger, more pleasant-sounding speaker; (2) standard quarter-inch phone jacks for paddle and output; (3) a built-in a.c. power supply with LED indicator and binding posts for battery operation; (4) more versatile and convenient switch placement; (5) a solid, stable unit that doesn't slide around.



Front view of modified CK-1 with paddle for size comparison. Left to right: LED, S-1, S-2, S-3. All switches are full up for normal operation.

The modifications are neither spectacular nor difficult, but they do result in a keyer that is extremely easy to use. The improved tone from the larger speaker is reason enough to make the changes. Of course, most of these modifications can also be applied to other AEA keyers and Morse code trainers with success.

You should first accumulate components for the power supply, switches, and connectors you wish to use. Then pick a cabinet of a size that will allow you to comfortably mount all the new components with room for the existing CK-1 keypad and associated keyer circuitry. I selected an LMB® C-R type cabinet measuring 6¼ ″ long, 3½ ″ wide, and 2 ″ high. I found it to be just large enough for my purposes. However, unless you have had some experience fitting a number of components into a small space, you may wish to choose a larger container. A cabinet with a sloping front might be handier for ease in using the keypad.

Remove the CK-1 from the original plastic case by removing one screw on each side of the case. Make a note of which wires go to which connectors, especially the power-supply input. This will ensure that you will be able to reconnect them to the proper places in the new cabinet. Unsolder all leads to connectors and the **Send/Load** switch. I lengthened these leads by soldering additional lengths of stranded wire and insulated the connections with heat-shrink tubing. You'll find this step will make the job of reconnecting easier.

Apply masking tape to the exposed surfaces of your new chassis. The tape will protect the surface while you are cutting and drilling, and will give you a good surface to mark the locations for the holes you will need. Carefully measure

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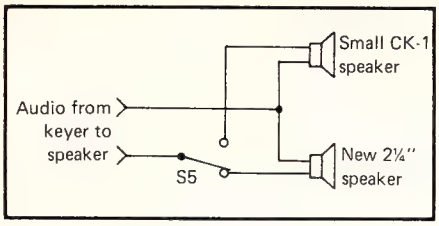


Fig. 1– Modified speaker circuit. S-5 can be eliminated if the original CK-1 speaker is not needed.

the inside rim of the keypad top of the CK-1. My keyer measured approximately 4¾" × 2 7/16" on the inside rim. With a ballpoint pen, transfer this rectangular measurement to the chassis you have selected. Remember to allow enough room at the back and front of your chassis for connectors and switches to protrude into the cabinet without touching keyer components, and be sure your power supply and speaker will clear the keyer and connectors.

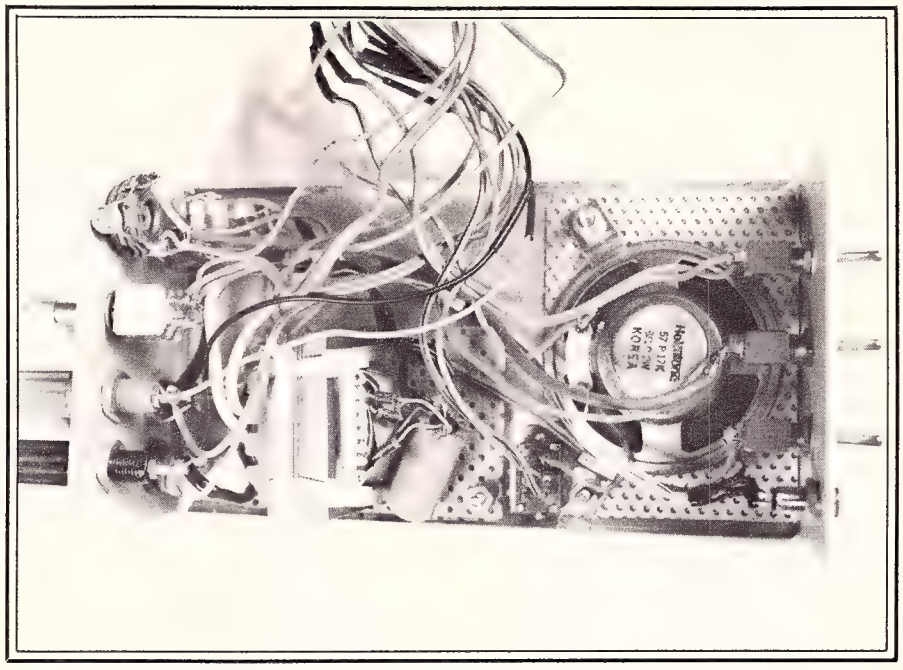
Drill four ⅜-inch holes near the inside corners of the rectangle you have drawn on the chassis, being careful not to get too close to, or outside of, the lines. Using a jig saw or sabre saw, cut the rectangular opening for the keypad just slightly smaller than necessary. Be sure to use a fine-tooth metal cutting blade, or you could bend the chassis. Now, with a flat file, smooth and even the edges, and enlarge the opening just enough to allow a tight friction fit for the keypad top. Don't take off too much metal at one time. It's safer to take it slow and easy with cutting and filing. You can always take more metal off, but you can't put it back once it's gone. A little extra care here will help ensure a professional-looking job.

You've completed the most difficult part. Now you merely drill holes for and mount the switches, connectors, and speaker. I chose mini-toggle switches, and ¼-inch phone jacks for paddle and keying output, but use whatever you prefer or have on hand. I mounted my 2¼-inch speaker on the bottom of the chassis. You could use a chassis punch to make the speaker hole or drill a number of holes in a circular pattern.

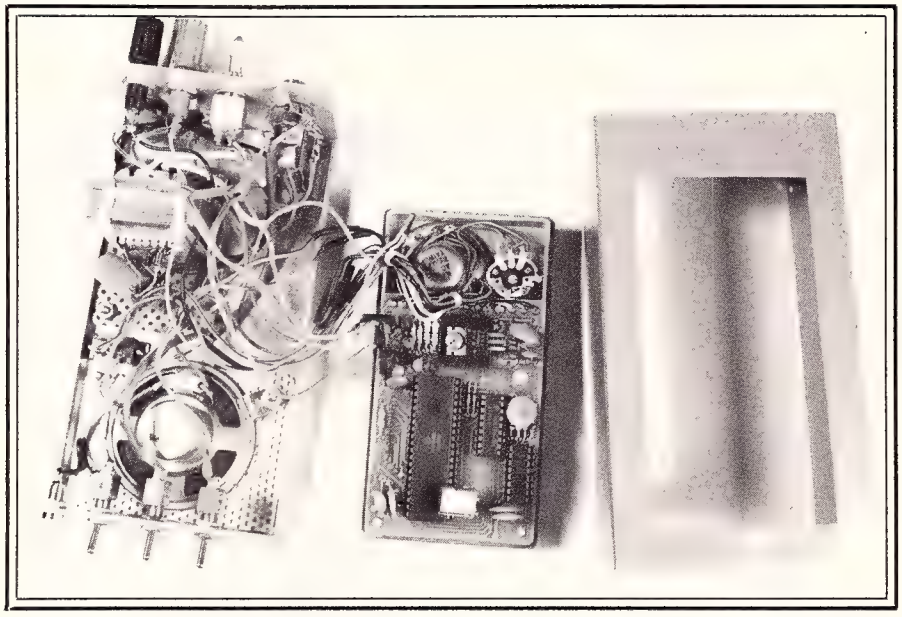
S-5, a small s.p.d.t. slide-switch, was added on the bottom of the chassis to allow choosing between the original and the new speaker, as per fig. 1. However, I found the larger speaker provided more audio and much better tone than the original at all volume levels and pitch settings, so the switch could be eliminated if you wish.

For a power supply I used a plug-in type a.c. adapter which supplied 14.8 volts with no load. The voltage dropped to 10.8 volts with the keyer drawing 260 milliamperes. I removed the plastic case and fastened the transformer and associated diodes and filter capacitor to a small piece of perfboard with tie wraps. If space is not a problem, you could build your own power supply, as shown in fig. 2. I provided a fuse in the primary of the transformer, and binding posts in parallel with the d.c. output of the power supply to allow its use with a battery for Field-Day-type operation. In addition, an LED indicator will show when the unit is powered up. The keyer requires approximately 9 to 15 volts d.c., and has its own internal voltage regulation provided by a 7805 regulator chip.

Although the keying output is bipolar, the instruction manual advises that with some transceivers, including the ICOM 701 and Ten Tec line, a jumper may be required across D4 to key properly. To key my Atlas 350 XL (positive keying), I found I also had to lift the cathode (banded end) of D3 from the board. Therefore, I added S-4, an s.p.d.t. toggle switch, on the rear of the chassis to perform the function of switching between positive and negative polarity keying (see fig. 3). Having rigs with both types of keying, I found this switch useful. If you only have one or the other, you could eliminate S-4. However, it could prove handy if you plan to use your keyer with a different transmitter.



Blowup view of modified CK-1. Shown at the right is the chassis top with the opening cut for the CK-1 keypad and keyer components (center). At the left is the chassis bottom, showing speaker, power supply, switches, and connectors.



Close-up of chassis bottom showing placement of speaker, power supply, switches, and connectors.

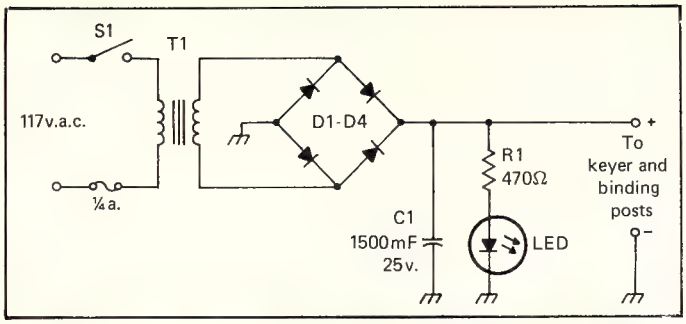


Fig. 2– Optional power supply circuit.

Rear view showing paddle input and keyer output jacks, keying polarity switch S-4, battery binding posts, fuse, a.c. cord.

Bottom view, showing speaker and mini slide switch, S-5.

The CK-1 will normally key the transmitter in both **Send** and **Load** modes. But by using a center-off-type switch for S-2, you can practice your c.w., or program the keyer without keying your transmitter. I much prefer to program the memory off the air. One position of S-2 allows you to tune your transmitter by shorting out the output jack. The center-off position allows operation off the air. The third position will allow the transmitter to be keyed normally. I used shielded cable (RG-174) for keying output leads.

For the **Send/Load** switch, S-3, I used a toggle switch, because I found it quicker and easier to use than the slide-switch provided. They are wired exactly the same, of course. In my keyer, all switches must be in the full up position for normal on-air operation.

Be sure to add rubber feet to your chassis to keep it from sliding around and to allow a space for the audio of your new speaker, if you've mounted it on the bottom of the chassis. I found the ¼-inch rubber stick-on-type feet found in hardware stores to be perfect.

Top view of modified CK-1.

The addition of press-on-type lettering to the keyer switches will put the final professional touch to your work. You've made a great keyer even greater.

Now, when you're going hot and heavy in a big contest or rag chewing with old friends, your personalized CK-1 will be working with you, belting out those dots and dashes with the sweet resonant tones that are music to any c.w. man.

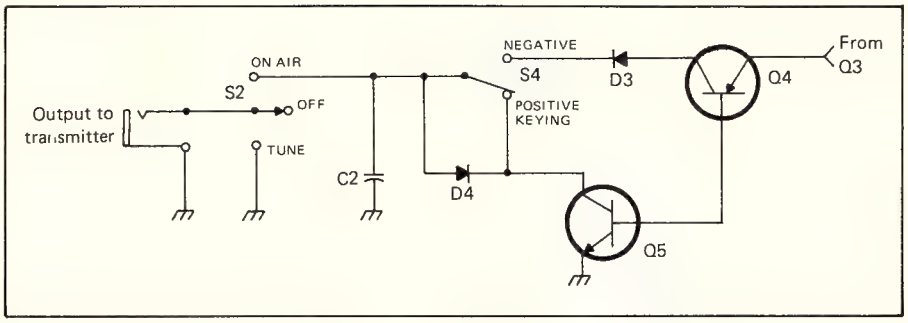


Fig. 3– Original keying circuit of CK-1 showing addition of S-2 and S-4. All others are existing components.

Parts List

C-1	1500 uf, 25 v. electrolytic capacitor
D1-4	100 p.i.v. full wave rectifier (Radio Shack #276-1171)
R-1	470 ohm, ¼ watt resistor
S-1	s.p.d.t. toggle switch
S-2	s.p.d.t. center-off toggle switch
S-3	s.p.d.t. toggle switch
S-4	s.p.d.t. toggle switch
S-5	s.p.d.t. mini slide switch
T-1	power transformer, 12.6 v., 300 ma (Radio Shack #273-1385)
Misc:	chassis, a.c. cord, ¼ amp fuse, binding posts, ¼-inch phone jack—2 conductor, ¼-inch phone jack—3 conductor, LED, rubber feet.

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CIRCLE 49 ON READER SERVICE CARD

1981 CQ WORLD-WIDE DX CONTEST C.W. RESULTS

BY BOB COX*, K3EST, AND LARRY BROCKMAN, N6AR**

Just when you thought the conditions were retreating into the past, Mother Nature smiled on the C.W. weekend. The conditions were not just good, they were outstanding. Comments from around the world testified to sunspot maximum conditions.

The overall All Band winner was the result of a close competition between 9Y4VT and CT3BZ. These two fine operators set an example for others in their operating techniques and duplicate-free logs. This year Richard Norton, 9Y4VT, took the world crown. He was followed closely by Martti Laine, CT3BZ. HK3A operated by Fred Laun of HS1ABD fame was third in the world, and N6BT/AHØ, who hopes to return to Saipan in 1982, was fourth.

The top USA All Band score was decided by less than a minute's operating time on a good band. K1GQ edged out K8LX for top place. The top five USA scores were better than the "old" 1980 record of 2.83 MEG points.

Four new continental record champions emerged: CT3BZ, Africa; N6BT/AHØ, Oceania; UF6CR, Asia; & EA2IA, Europe.

Single band entrants were paced by LU8DQ's World Record 21 MHz score. Jorge's location and operating skills present a tough combination to challengers. The following stations set new records: EA8AK, Africa (1.8); 4X4NJ, Asia (1.8); UA9TS, Asia (3.5); JE3MCC, Asia (7); UA9ADQ, Asia (14); OH8SR, Europe (14); YU3ZV, Europe (21); KG6DX, Oceania (14); YV1DO South America (1.8).

In the USA, W1ZM (K1ZM op.) (3.5), KØRF (7), K6EWL (21), and N4ZC (28) all set new records.

In the Multi-Single category, P41E took the world top honors, thereby setting a new South American record. Second place winner, YU3EY and his crew, set a new European record in the highly competitive European Multi-Single division.

The new USA Multi-Op. Single Transmitter record holder was N4AR. The boys from Maine, N1AC, pushed Bill's crew to the wire before settling for second place. W3BGN rounded out the top three USA scores.

Ibrahim, SU1IM, the Grand Old Man of Egypt, is still active daily. On the left is Ville, OH2MM, a visiting op at SU1AA.

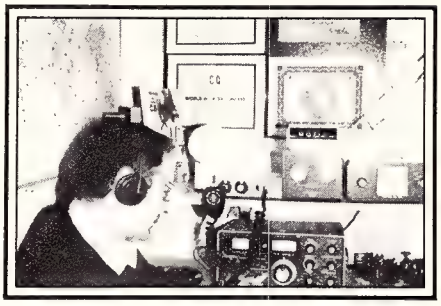
In the battle of the Goliaths, W2PV captured the top world Multi-Multi score—no easy feat for a US station. They were followed closely by N2AA. W2PV beat the old US record by over a million points. In Europe the top honors went to the gang at OH3AA. They also set a new European record, and to finish off the Multi-Multi records way out on Niue, ZK2RU set a new Oceania record.

The contest is made more interesting by expeditions. The trophy for Single Operator expedition goes to SU1AA operated by OH2MM. This trip not only gave contesters an uncommon country multiplier, but also a rare zone. The expeditions of the following made the contest a pleasure: N6BT/AHØ, ZK2RU, V3MS, K8CW/C6A, 8P6J, VP2VHX, HH2VP, VP2MEV, J6LZA, W4UY/PJ7, SU1AA, CT3BZ, C5AAU, 9K2DX, 8Q7BP, FCØFOO, YJ8RW, K3SA/PJ3, 9Y4VT, W4BPD/C6A, 6Y5JW, OHØAL, HBØAYZ, P41E, 9Y4KG, and FOØKP. Thanks for all your efforts.

Nigel, G3TXF (left), and Roger, G3SXW (right), arriving in Alderney (one of the three islands that make up GU3) for the 1981 CQ WW DX CW Contest—operation GU3SXW.

The QRPp category is now well established. This year we had over 110 entrants. The All Band winner was AC2U. He beat out N3RS for the top World and USA position. In the future, if QRPp continues to grow, the committee will have to devise a better awards technique. Do you have any suggestions? If you do please write to the committee.

The World high club score goes to the Northern California Contest Club. This Club went from 9 MEG points in 1980 to over 160 MEG in 1981. Congratulations! Following in a very, very close second place was the Yankee Clipper Contest Club. One or two scores would have made the difference between first and second place. The Frankford Radio Club rounded out the top 3 club scores in the world. The top DX club score was the Lithuanian Contest Group, followed by the competitive scores of the Voroshilovgrad Radio Club (UB5) and the Kaunas Polytechnic Institute Radio Club.



Chas, IØXXR, shown with FT-101 rig and TH3MK3 antenna.

The contest community around the world will remember this fall when the signals are strong and clear that a few of our friends are not present. W2PV, UI8LAG, and W3KT have become Silent Keys. Each one contributed to what the contest stands for: enjoyment and excellence. We will miss them.

The following people devoted much time and effort to verifying the results: Frank, W1WY; Terry, N6CW; Glenn, K6NA; John, K1AR; Jim, W7EJ; Dave, K2SS; John, K9DX; Fred, AD6C; Doug, KR2Q; Gene, N2AA; Reg, N6SV; and new committee members John, K2VV; Ed, N3ED; and Tree, N6TR.

We all wish you the best of a good contest season.

73, Bob, K3EST, and Larry, N6AR

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**7164 Rock Ridge Terrace, Canoga Park, CA 91307.

U.S.A. QRM

Working ZK2RU for first contact with Niue in 47 years . . . *W4DGJ.* Thrill to work VQ9 & HZ long path, 7 MHz . . . *K4PI.* Best contest of them all. My first time for CQ WW CW; too bad it's always on Thanksgiving . . . *K5NW.* Precip static made me yearn for my old quads . . . *K6NA.* Lay down on Saturday night for 2 hours and wound up sleeping for 13 hours . . . *KD9E/6.* Tough using a KT-34 on 40/80 . . . *WD6EWG.* My neighbor's new video-recorder did me in . . . *WB6EXW.* There is nothing quite like the "WW" for competitive sport . . . *W6US.*

Wait till next year! . . . *N1AC.* Worked CT3BZ on 5 bands—sure hope that bottle of wine comes in soon . . . *K1XA.* Hitting 100 QSO's/hr on 28 MHz, WAC on 7 MHz with the Butternut vertical . . . *KQ2O.* This still remains the premium DX contest of the year . . . *K2TD.* Next year we're going to use a beam and linear . . . *N4RJ.* FB8WG called me on 15 . . . *W5RRR.* Got to be pretty good at replacing diode stacks in SB-220's during the contest . . . *NC6T.* This year HZ1HZ tail-ended a European, calling me . . . *W7IR.* Enjoyed the PREMIER CW Contest of all . . . *KD7H.* In Washington State we had only a brief 10 meter opening to Europe—a hint of the future . . . *W7WA (Opr. of K7RI).* It seems the rarer the DX station, the longer he takes to identify . . . *N7RO.* In the desert the heavy rain wiped out my balun . . . *K7NO.* Maybe it's time to reconsider the RST exchange for contests . . . *K7FC and N7ES.* A beam and Extra Class ticket sure help on 40! . . . *K7ABV.*

Along with my 160 meter log please find list of serious violators of the DX Window—request you start disqualifying those who take part . . . *KØPP/7.* New countries, lots of activity, antenna testing—that's the CQ WW . . . *KG7D.* Conditions so good it was hard to pick the right band to be on . . . *K8LX.* 48 straight is tough on the body . . . *N8II.* Caught the flu by preparing so frantically for the Test—just exhausted . . . *K8GL and W8UA.* My indoor dipole for 10 snagged 152 QSOs . . . *W8GOC.* Fun? Cracking some BIG pileups with 200 watts! . . . *N8BC.* A hot final amp helped in my unheated garage . . . *K8BA.* 250 QSOs with a straight key—whew! . . . *WD8IXE.*

When the amp blew, I drove 120 miles for tubes and got back in the Contest . . . *WD8AUB.* Simply, thanks to all for a great weekend . . . *W8LRL.* Zones 17 and 18 called *me* on 80 meters! . . . *K9BN.* First contest—I'm hooked! . . . *KC9T.* Finally got that Zone 34 . . . *AKØM.* Really great runs to Europe on 40 . . . *KØRF.* We were killed by severe line noise on all bands. It came up one-half hour before test . . . *N5RM.* JA signals at dawn on 3.5 MHz Sunday morning among loudest ever heard . . . *K1ZM.* Biggest thrill—no breakdowns! . . . *AI1E.* Worked TG9AC for number 86 top band . . . *AA1K.* Are you sure 10 meters is on the way out? . . . *KA1CFC.* My Extra Class license came in the mail 7 hours before start of contest . . . *WA1FCN.* Worked CT3 as first DX on 80 meters . . . *KA1CZF/QRP.*

DX QRM

This is my swan-song contest, since I am entering the OTC this year . . . *OH2BH (Opr. of CT3BZ).* Best condx ever on CW weekend; ran out of stations on Sunday . . . *VE3BMV.* Lazy, tired and cold = me . . . *VE1AIH.* Great fun—CU next year . . . *VE6OU.* Lost rotator at 4 hours into contest and amplifier 10 hours later. Thanks a lot Murphy . . . *KH6ND.* I must have been popular. A lot of stations wanted to work me again and again and again . . . *VE1BEC.* Did enjoy your contest very much . . . *VE2DPO.* Bit confusing at first with stations using short figure "A" instead of "1" . . . *VO1AW.* No time for full effort, but couldn't stay away entirely! . . . *VE1BCZ (Opr. of VE3UOT).* Not good propagation in Melilla . . . *EA9JV.* Extremely difficult working zones 6, 7, 10, 12, as these are completely blotted out by U.S.A. stations . . . *ZS2RM.* JT60UB QSO! . . . *VE2GCO.* Much less intensive contest effort this year after major efforts as 5W1BZ . . . *ZL1AIZ.*

U.S.A. beaming east while Europe beams west; no one beams south . . . *VK2AYD.* No permission for 3.5 or 7 MHz . . . *OH2MM (Opr. of SU1AA).* To those who did not get in the log, I will be back next year . . . *N6BT/AHØ.* Biggest thrill was having 8Q7BP answer my CQ . . . *4X6FY.* Vy nice condx first night (160 M) . . . *EA8AK.* Almost no CW activity from Africa, So. America, and Caribbean . . . *VE1TG.* Condx mediocre (3.5 MHz) . . . *KP4KK/DU2.* Condx much to be desired on 28.100–28.600 (Australian Novice freq.) . . . *VK5NVV.* Conditions couldn't really have been better on 40 M . . . *VE3KRN.* The activity was tremendous overall with good condx into Europe (7 MHz) . . . *VO1QU.* Much more courtesy than discourtesy . . . *KH6JWK.* Surprised with 579 from VP8ANT (1.8 MHz) . . . *VE3INQ.* Hard to believe the multiplier on 7 MHz equal or greater than 21 and 28 MHz . . . *VE3IY.*

100 m.p.h. winds blew down 40/80 M inverted Vee on 2nd night and prevented turning the beam . . . *FC0FOO.* Fantastic contest; for the first time over 2000 QSO's and solid total score . . . *ON4FD.* My new antenna mounted late Friday afternoon . . . *OZ8AE.* Think the time has come to consider a bug-key . . . *G3XTT.* K9GL was audible at 0500 GMT on 21 MHz . . . *G3RAU.* Band opening of 15 appeared like a sunrise. First a few weak signals, and within a few minutes the band was roaring . . . *DK3GI.* Made 17,000 points more than last year . . . *Y34SE.* Propagation was unexpectedly good . . . *TF3YH.* Confusing when KP4KK/DU2 and UK1PGO both call on the same frequency (3.5 MHz) . . . *SM4CAN.* Was delighted to work VP8ANT for an all-time 1.8 MHz new country. Also made top band WAC for the first time . . . *GW3NYY.* First attempt and found the matchsticks in the eyes needed replacing often . . . *G3XKQ.*

It is very clear that it is impossible to work much DX with poor antennas. See you next year with new "antenna farm" . . . *HAØDU.* Beautiful Contest, big QRM . . . *I2WDB.* In my Zone blackout in electricity for 6 hrs . . . *ISØMVE.* Vy interesting contest. First time on CW . . . *OH5OZ.* Copying code after 47 hours without sleep is a bit difficult. Duplicate problem is getting very bad . . . *OH8SR.* Propagation good this year. None of the usual power line or storm damage. Expect some low band record to be broken . . . *OK2BFN.* Hard work for 48 hrs; I vote for some rest period . . . *4N1U (YU1PKC).* Bad condx second day and linear amp went QRT . . . *YU3EW.*

We surely need a beam on 40; perhaps next year! . . . *F3TV.* Excellent QTH on the island of Alderney went someway in compensating for mediocre antennas . . . *GU3SXW.* Excellent band opening and activity from U.S.A. and Canada on 40 meters . . . *HG5A.* The signals from USA were better on 7 MHz than on any other bands—worked 22 states! . . . *I2UIY.* Wish we had 160 M! . . . *SM5GMG.* Biggest thrill—every QSO with my 3 watts and dipole only 2 meters up . . . *OK3CAA/P* (QRP—160). Conditions were so FB on low bands that we forgot to look after multipliers . . . *OH7AB.* Many U.S.A. stations on all bands . . . *UR2RHF.* Thanks for nice contest. My first time entering single band 80 M, very FB! . . . *UR2QD.* Very FB conditions on 28 MHz . . . *UA1DF.* QRP power, QRP antennas, QRP time, but QRO fun! . . . *VE3KZ.*

STATION OPERATORS

Multi-Operator Single-Transmitter

AA3B & WA3NRU, WB3DJF. **AA4KT** & AA4H, N4DW. **AA6T** & N6BSU, Net. **AF6S** & Net. **AH6BK** & K7TI, WB6SHD. **AD8I** & K1LT, K8ND, KA8HFO, WB8YSD, WD8ALG. **DKØSU**: DF7TV, DL3SAS, DL5TT, DL5TV, DL9SAL. **DKØTU**: DK5GB, DK5HH, DK6QI, DL7ZN, DF5GX, DL7PL, DK2VQ, DK1PD. **DLØJR**: DL7AEN, DL7ON, DL7SI. **EA3CNY**: DJ2YE, DK3KD. **EA3MM**: EA3BEN, EA3BRL, EA3CAC, EA3CRX, EA3CVD, EC3AEF, EC3AFM, EC3AT. **EA3RCR**: EA3AIR, EA3ALV, EA3AZY, EA3IH, EA3JA, EA3OG. **F3TV**: F5IN, F6ARC, F6BEE. **F6KAW**: F2QQ, F6ASS, F6BBO, F6BPX, F6CWN, F6DJB, F6DZS, F6EBN, F6EPY, F6FLV, F6GDK, F6GIF, F6GWV, F6HCU, F6HMQ.

G3SSO: G3FXA, G3MZV, G3NKS, G4BEZ, G5EBU, G8DV. **G6UW**: G3ZAY, G3ZRJ, G4BUO, G4FAM. **G8JC**: G3NXQ, G3RLF, G3TQD, G4KTW, G4AAL, G4NEC. **GB2MM**: G3RZI, G3XVR, G4DSE, G4GXL, G8IUY. **GU3HFN**: GU3MBS, GU4CHY, GU4EDN. **GU3SXW**: G3SXW, G3TXF. **G3RRS**: G3SJK, G3UKS, G3VPW, G4CEB, G5CMX, G5DQY. **HA9KOL**: HA9OL, HA9OT, HA9PG, HA9RC, HA9RS, HA9RX. **HAØKHW**. HAØHW, HAØIF, HAØIR. **HB9AJ**: HB9AQF, HB9BAQ, HB9BRW, HB9BWN, HB9CBT, HB9CCT, HB9CIO. **HBØAYZ**: Stoeckli, Schuetz. **HE9OZH**: HB9RE, HB9Z. **HG5A**: HA5FM, HA5FN, HA5GF, HA5JI, HA5LN, HA5MK, HA5OM, HA5PP, HA7RY, Budai **HG6V**: Laszlo, Laszlo, Geza, Lajos, Gyozo, Istvan.

I2UIY & I2PJA. **JA3YEE** & JA3JF, JA3WLF, JA6HFV. **JA1YCL** & JG1GQB, JK1JSS, JE2RQU, JH8MHZ. **JAØYAK** & JA8RWU, JA8TUJ, JAØOGH, JH7WUH, JR7JLH, JH7ISE. **JA1YAD** & JA1QGC, JK1AES, JE2QIZ, JA3XIS, JR6JOE, JHØDRT. **K1EB** & W1XK. **K1GSK** & WB1FPF. **K1RQ** & AI1S, KB1W, **K1RU** & K1YR. **K1XA** & W1OD, AA2Z. **K1XM** & K1PR, N1EE. **K2BA** & KB8MF. **K2TD** & Net. **K3QMR** & W3YQ, WB3KKX, KA8GCD. **K3ZUF** & KF3R. **K4EBY** & K4YEP. **K5KG** & KD4M, WN4KKN, K5TU, K5VWW, N5DU, W5SG. **K5RX** & KM5R. **K6ANP** & K6LRN, KK6X, N6DCJ. **K6DC** & K6KCM, K6MA, N6ST, W6BJH. **K6HIH** & K6AHC. **K6SG** & KV6H. **K6XV** & K6PJY, N6FJ, N6VV. **K7CS/Ø** & WAØECN. **K8AQM** & AC8W, AI8D, K8DD, K8MJZ, KC8KQ, KJ8A, WA8ARS, WA8MEC, WD8CRY. **K8US** & WD8IJR. **KØRWL** & KØFPC, KØUAA, KBØG, KCØCL, KMØL, KJØQ. **KA3GIK** & WB3FIZ. **KA8HUZ** & KA8HXX. **KB2CR** & KC2IX, WA2HUY, WB2CAA. **KB3MM** & N3ARK. **KB6ST** & K6CSL, N6CVC. **KBØFP** & KØINR. **KFØH** & WDØEWD. **KJ5W**: AK5V, K5EE, KV5Y, N5WS. **KL7AF** & AL7DH, KL7HBK. **KQ2O** & K2BK.

LA1H: LA4KQ, LA8UL, LA9OI. **LZ1KKA**: Mihova, Mihov, Obretenov. **LZ2KEF**: LZ2CC, LZ2PO, LZ2HE, LZ2DF, LZ1A31O. **LZ2KLR**: Marinow, Petrow, Zamfirow. **LZ2KSQ**: Kirilov, Nikolov. **N1AC** & K1UO, W1IHN. **N1TZ** & K1SF, K1DKX, K1FIR, K1IU, KA1ERF, N1ACU. **N2GC** & N2KW, WA2BOT, WB2RNT. **N4AR** & N1GL, K1NA, N4KG, W8KIC, WA8TBQ. **N4KE** & AJ2E, KJ4N, W4FDA, W4ORT, WA4SGF. **N4RJ** & N4HI, N4OL, N4PN, N4TZ, W8ZF. **N4RV** & N4RA. **N4XM** & KC4WQ, NO4R. **N6CW** & K1LL, KT6V. **N6DHV** & K6RIR, N6IC, WA6TLA. **N6IG** & N6NE. **N6MG** & KD6PY. **N6ND** & N6SO, N6ZL, W6UQF, WA6DBC. **N6RZ** & W6NV. **NQ4I** & KA4MNS, KS4Q. **NC6T** & NF6H, W6CCP, W6TSE.

OE1JNB & OE1DSA. **OH2AA**: OH2BNP, OH2BQS, OH2BX, OH2JA, OH2YY. **OH2VY** & OH2BAZ, OH2BEN. **OH3AC**: OH3BJ, OH3ST. **OH5BM** & OH5BB, OH5LP, OH5UQ. **OH7AB**: OH7PF, OH7UE, OH7VR. **OH8AV**: OH8PF, OH8SW. **OH9PH** & OH9UW. **OHØAL**: OH2DP, OH2FS, OH2LP. **OK1KQJ**: OK1AYP, OK1AZG, OK1BY, OK1DC, OK1DLE, OK1DVB, OK1ICM, OK1IMP, OK1IMR, OL3AXS. **OK1KRG**: OK1ADS, OK1ALW, OK1AWZ, OK1DIM, OK1DWA. **OK1KSO**. OK1AEZ, OK1AMF, OK1JCW, OK1JJB, OK1JKT, OK1JWA, OK1SF, OK1WT. **OK1KTW**: OK1ADU, OK1DKA, OK1MSN. **OK1KUA**: OK1ASQ, OK1-22317. **OK1KYS**: OK1DEY, OK1FRF. **OK2KYC**: OK2BSK, OK2BUC, OK2SMO. **OK3KEE**: OK3CGG, OK3CTL, OK3MB, OK3TKA. **OK3KTD**: OK3CES, OK3TBA, OK3TCF, OK3TCV. **OK3RJB**: OK3CKW, OK3CQD, OK3CQR, OK3SEM, OK3TCL, OK3TDO, OK3-26627. **OK3RKA**: OK3CPC, OK3TAM, OK3TDP, OK3-26016, OK3-27254, OK3-27256. **OZ5EDR**: OZ1HET, OZ3QN, OZ9SN.

PA6GN. PAØERA, PAØGAM, PAØGIN, PAØVAJ **P41E**: KØOO, K3NA, K4BAI, N4TO, W6OAT. **R5I**: Club. **SK5AA**: SM5ACQ, SM5APS, SM5FUG, SM5KAS. **SKØLM**: SMØCXU, SMØDRD, SMØFSK. **SM2JUR** & SM2BJE. **SM5GMG** & SM4GLC, SMØGNU. **SP2ZFJ**: SP2ASJ, SP2FAP, SPØ206-EL. **SP3KTC**: SP3CCT, SP3JII, SP-1151-PO. **SP5KTR**: SP5DWE, SP6SA, SPØ083WA. **SP6PAZ**: SP6FJG, SP6HEK. **SP9PDG**: SP9CSW, SP9-2291. **UK1TBB**: UA1TAL, UA1TDS, UA1UG. **UK2AAP**: Club. **UK2AAQ**: Club. **UK2AAX**: UC2AFX, UC2008-119, UC2009-522, UC2009-523.

UK2ABC: Getjmann, Novikov, Sologub. **UK2ABM**: UC2AAP, UC2009-575, UC2009-593. **UK2BAG**: UP2BAD, UP2BAE, UP2BV, UP2BZ, UP2DT. **UK2BAP**: Club. **UK2BBB**: UP2BIJ, UP2MB, UP2PAX, UP2PX, UP2038-727, UP2038-892, UP2038-938, UP2038-1039, UP2038-1052. **UK2BBF**: UP2BJD, UP2BIY, **UK2BBQ**: UP2BAT, UP2BFV, UP2BJY. **UK2BBX**: UP2BJQ, UP2038-1051. **UK2BCC**: UP2BJK, UP2038-728, UP2BDW, UP2038-271. **UK2BCM**: UP2BFN, UP2BSK. **UK2BCO**: UP2038-1050, UP2038-1049. **UK2GDZ**: UQ2GAE, UQ2GFM, UQ2037-168, UQ2037-261 **UK2GJL**: UQ2GEJ, UQ2037-91. **UK2GKO**: UQ2GCT, UQ2GFD, UQ2PP. **UK2GKW**: UQ2GKM, UQ2OC, UQ2OI, UQ2037-83. **UK2PAM**: RP2BFU, UP2038-794. **UK2PAO**: UP2BHN, UP2BIC

UK2PAP: UP2BCI, UP2BIM, UP2NV, UP2OX, UP2038-1665, Petras. **UK2PAT**: UP2038-439, UP2BCW, UP2BCO. **UK2PBR**: UP2BCU, UP2038-1541. **UK2PCR**: UP2BBT, UP2BCR, UP2BCT, UP2BDF, UP2BEY, UP2BFI, UP2BFL, UP2BIO, UP2PAV, UP2PCI, UP2038-1620. **UK2PRC**: UP2BBM, UP2BIL, Laimas. **UK2RDX**: Club. **UK2TBC**: Club. **UK3ACM**: Club. **UK3APV**: UA3DOW, UA3DPX, UW3BV. **UK3DBV**: UA3DFO, UA3142-1762, UA3142-1770. **UK3TBF**: Club. **UK3XAB**: UA3XAC, UA3127-200, UA3127-204, UA3127-216, UA3127-322, UA3127-348.

UK4ACE: Club. **UK4FAV**: UA4FBL, UA4FCD, UA4FCM, UA4FDY, UA4148-273. **UK4LAZ**: UA4LAJ, UA4LBE, UA4LBN, UA4LCH. **UK4PNZ**: Club. **UK4WAA**: UA4WBC, UA4WBG, UA4WBV, UA4095-510, UA4095-511. **UK4WAB**: Club. **UK5AAZ**: UB5AAL, UB5ABZ, UB5ADN. **UK5ECT**: Club. **UK5FAB**: UB5FCR, UB5FEL, UB5070-677. **UK5GKW**: Club. **UK5HAB**: EZ5HBO, UB5071-73. **UK5IGL**: Club. **UK5MAF**: RB5MUV, UB5MDC, UB5MJX, UB5MNM, UB5MNX, UB5MOA, UY5LK. **UK5MCO**: UB5MRN, UB5MTS.

UK5MCP: UAØBDD, UB5MOJ, UB5MLV, UB5MPD. **UK5MCT**: UB5MRI, UB5MRM. **UK5MDI**: UB5MBM, UB5MJS, UB5059-5, UB5059-6. **UK5MEG**: RB5MHY, RB5MUQ, UB5MAQ, UB5MRB. **UK5NAJ**: UB5NBE, UB5NDA, UB5057-273. **UK5QBE**: UB5064-1353, UB5064-1362, UB5064-1528. **UK5QCI**: Club. **UK5UDX**: UA4LAR, UB5LAR, UB5RCA, UB5UCE, UB5UCF, UB5065-2. **UK5YAA**: UB5YAE, UB5YAH, UB5YAR, UB5YAW, UB5YBX.

UK6AJN: Club. **UK6APP**: EZ6ACB, EZ6ADW, UA6ARX. **UK6ARA**: UA6APL, UA6APU. **UK6FAA**: Club. **UK6FAB**: Club. **UK6LAA**: Kozadaev, Khanin, Korovkin, Liokumovich, Larionov, UB5073-1133. **UK6LAZ**: UA6LHK, UA6LIG, UA6150-1067, UA6150-1060, UA6150-1070. **UK6LEZ**: UA6HLP, UA6LJE, UB5ILW, UB5MGZ. **UK6LTA**: UA6LAM, UA6LWD, UA6LYQ, UA6150-621, UA6150-686, UA6150-688. **UK6PAA**: Club. **UK6QAA**: Club. **UK9AAN**: UA9AIS, UA9AJD, UA9AKI, UA9ALP, UA9QBS. **UK9ACP**: UA9AAP, UA9ADE, UA9ADY, UA9AFO, UA9AGY, UA9165-1635. **UK9ADS**: Club. **UK9ADY**: UW9AT, UA9AFZ, UA9AFH, UA9ADH. **UK9AEC**: Gordlevskih, Zaev, Kovalyov.

UK9FER: UA9FAR, UA9FAL, UA9FAJ, UA9FDW, UA9FGJ. **UK9OAZ**: Club. **UK9OBO**: UA9OCK, UA9ODH, UA9145-805. **UK9SBI**: UA9SCG, UA9SHU, UV9SA, UV9SG, UW9SG. **UK9WAT**: Club. **UK8QAA**: UA0QDL, UA0QWB, UA0QWN, UA0098-74. **V3MS**: WØCP, WØUN. **VE1DXA**: VE1BSE, VE1FH, VE1MX, VE1UG, VE1YX. **VE3MFA** & VE3IUE, VE3KTC, VE3LWL, VE3MFZ. **VE3OCU**: VE3MHA, VE3MPX. **VE5DX** & VE5AAD, VE5RG, VE5XK. **VE7WJ**: VE7ZZ, W7XN, W7ZR.

W1BK & N1BHI, W1BR. **W1RM** & K1JD, KA1BUQ, W1BIH, W1WEF, W1XX. **W2RQ** & W2SQ. **W2UI** & N3KR. **W3BGN** & K2BMI, KC2X, WA2ZKY. **W3KFQ** & K2JLT. **W3NZ** & KA1CQM, KD3H. **W4BPD/C6A** & KA3DAG. **W4NL** & K3AO, K3KG, K4FJ, KA4S, KU4W, N4TX. **W5RRR** & K5GN, KG5U, KN5F, KN5H, WB5WHR. **W6BSY** & Net. **W6OWQ** & AG6D, N6BV, N6BZA, WB6DSV, WD6ERA. **W6UA** & W6UM. **W6YX**: N3ER, WA6ITV. **W7NI** & AI7B. **W7RX** & K7XX, W7YOZ, WB7FFF. **W8FN** & AD8P. **W8WE**: AJ8T, KA8FRQ, KA8MDM, KB8MG, KC8AU, KC8NH, N8BAZ, N8CJR. **W8FF** & KI0K, W0WYJ. **W8NA** & W0AR, WC0W, W0FNO. **WB1CNM** & N1BVZ. **WD8PNF** & K8RMN, N8CID, W8PBS, W8ZK, WA8SNF, WA8VTS, WD8MDG. **WL7E** & NL7K, KL7EC.

XE2BC: N6OP. N6TU. **Y23DL** & Y23CL, Y27DL. **Y32ZN**: Y32UG, Y32WN. **Y41ZA**: Y23BA, Y41VA, Y41ZA. **Y41ZF** & Y21CF. **Y43ZK**: Y22BK, Y32YG, **Y59ZA** & Y45SA, Y59YA. **YO8KGA**: YO8DD, YO8DAV, YO8ER. **YO8KGH**: YO8AIN, YO8CMB. **YU3EY** & YU3BO, YU3FK, YU3SO, YU3MY, YU3TVI, F5QQ **YU4EXA**. YU4WFT, YU4VRA, YU4WFN. **4A2Q**: XE2AQ, XE1BGM, XE2GDD. **6Y5JW**: VE3DAP, VE3IYS. **9Y4KG**: W6KG, W6QL.

STATION OPERATORS
Multi-Operator Multi-Transmitter

AI6V & NB6G, N6KT, KB6F, W6MYP, W6UYKM, W6EEN, WB6FBI, K6KLY. **DLØKF**: DJ8FR, DF3LP, DJ2BV, DJ4FZ, DK8LE, DF6LI, DJ7SW, DL5LC, DK8LD, DK7LJ, DF6LH, DJ4SO, DL2ZT, DF3LZ, DL2NF, DJ2LU, DK9AV. **FØKP**: W6SZN, N6TV, AA6G. **HZ1AB**: KØJJ, W7KJJ, WB8MOA, N6OL. **JA1YAG**: JI1OHP, JF2FDH, JH7NZU, JHØGGR. **JA1YHA**: JH4TJS, JJ1AEB, JK1LSE, JA4OYR, JJ1UEJ. **JA1YXP**: JHØNPR, JH4OWG, JA7WFS, JAØWGG, JF2QHM. **JA2YEF**: JR2PVI, JR2TPD, JR2TWA, JR2UWZ, JE2FRT, JE2KIH, JE2RDI, JE2RWP, JE2UGT, JE2WBH, JE2WJB, JF2ACB, JF2ERH, JF2NFC, JF2NTV, JF2SFF, JF2VRV, JF2WMP, JF3EIT, JH4XKV, JH9LTW. **JA2YKA**: JG1GIF, JJ1BTA, JE2NQC, JE2RQT, JE2SRB, JH2QXG, JR2GMC, JH4VBQ, JH6RPZ, JA9NFO, JA9SSY.

JA3YBF: JE3PAS, JE3PED, JF3KKO, JF3PGA, JG3GKK, JG3GQB, JG3IUG, JI3BPB, JI3KWZ, JH4CES, JH4IFF, JR4AGT, JH5BIT, JH5JKH, JA9TAF, JA9TOZ, JA3-30356. **JA3YKC**: JE3BLA, JA5TDH, JR4BSM, JR3FRR, JH3PKS, JF3PMM, JH3PRR, JA5MOU, JF3RAL, JE3MXQ, JH4PAM, JG3IQJ, JR6JNF, JE3MAS, JH4WER, JG3LLB, JF3SFP, JH3VOT, JR3KEG, JA5GZB, JA3ODL. **JA4YEB**: JR2EVU, JH4AQA, JH4MBE, JH4NJC, JR4CBJ, JR4MOQ. **JA6YDH**: JE6DSG, JA4JYL, JE6ASN, JH6MWG, JH6NLY, JH6RAD, JH6SWF, JE6LFQ, JE6SAY, JG1TAW, Kamito. **JA7YAA**: JG1IGW, JR2NKG, JH7AEF, JH7CUO, JH7GFO, JH7HWR, JH7LIS, JH7UJN, JH7WTC, JR7OMD, JR7SEI, JE7AWM, JH8BME. **JA9YBA**: JA9DZS, JA9LJI, JA9LNJ, JA9LWB, JA9OTX, JA9UAD, JHØCAZ, JHØHHU. **JF1YPF**: JH1OGC, JR1MTS, JR1UTC, JG1GGF, JE1QDQ, JJ1AJT, JK1KZA, JL1KYN. **JH1YDT**: JF1EAL, JK1CPG, JK1FLU, JH6UUN, JAØVSH, JHØHNI.

K1OX & N1RC, WB8BTH, K1VR, K1RX, W1FV, KC1F, KB1T. **K1ZZ** & K1BW, K1CC, K1GX, K1TO, W1GNC, AK4L. **K2TR** & K2WR, K1CO. **K2UA** & W3XU, N3RD, N2ME, N2BA, WA2HGM, WA2SFB **K6XO** & W1ARR, N6AUV, AA4KB, KD6ZL. **K6ZM** & K2PV, AK6T, NB6L, WA6JCZ. **K9GL** & K9BG, WB9TIY, K9RS, WD9IIC, W9OFV, K9NO, KJ9W, K9HMB, WB9CAS, K9PW, AG9A. **KD6NH** & N6KB. **KN6M** & AH6Z, AA6DX, KD6T, KJ6V, KB6YF, N6PO, W6MFZ, N6DN, KB6XN, N6BPL, WA6AVS, WB6KNU, Betty, Sonya. **N2AA** & K2GL, K2BQ, K2NG, K2GM, K2TW, K2SS, K2TT, KR2J, KR2Q, KR2W, KU2M, K5NA. **N2RM** & N2ATX, N2MM, KB3TN. **N3RW** & W3YFV. **N5RM** & NS4M, AA5C, K5IU, K5MM, KM5X, N5BQQ. **N6RO** & N6XI, N6CN, WA6DIL, WA6WEQ, K6XM, K9LBQ, KB7SC. **N9MM** & K9UWA, W9LT, N9NC, KC9C, K9FN, N9NS, KB9AF, K9JF, WB9STD, W9RE, WB9POH, W9ZRX, W9OBF

OH1AA: OH1LF, OH1LQ, OH1MD, OH1NH, OH1OI, OH1OG, OH1RM, OH1SV, OH1SW, OH1SY, OH1TV, OH1WR, OH2PQ, OH3OM, OH3ZE, OH5NG. **OH2AW**: OH2BNP, OH2BPN, OH2BQS, OH2JA, OH2BBH, OH2BEO, OH2JG, OH2EE, OH5UX, OH5XL, OH6UM. **OH3AA**: OH2CR, OH2DT, OH3UU, OH3JR, OH3XT, OH3WS, OH3XS, OH3TQ, OH3YI, OH3EQ, OH3WZ, OH3KS, OH3RF, OH3IQ, OH3XZ. **OK1KPU**: OK1AXA, OK1JAX, OK1JDX, OK1DLD, OK1MMW. **PA6WW**: PA3ABA, PA3ADJ, PA3ADM, PA3BFM, PA3BFX, PA3BIL, PA3BTH, PA2DXY, PA2PMF, PAØAAJ, PAØIMA, PAØJWK, PAØLVB, PAØSKP, PAØVDV, PAØPSK, PAØKOR, F6DXE. **U2R**: UR2FQ, UR2FU, UR2HU, UR2IG, UR2HB, UR2JW, UR2MS, UR2RAM, UR2REC, UR2RKF, UR2RMB, UR2TAB, UR2-083-910. **YTØR**: YU1EW, YU1UU, YU10FJ, YU70QI, YU70QZ, YU7QBC, YU7QFK. **YU3APR**: YU3FR, YU3FK, YU3DM, YU3BO, YU3SO, YU3TUX, YU3EO, YU3TVI, YU3EY. **W1YN** & AG1C, AK1A, KA1O. **W2PV** & K1DG, K1JX, KA1R, KC1Q, N2NT, WA2SPL, K2SX, K2XA, K3UA, WA3ZAS. **W3GM** & K3GM, K3OA, K3ND, K3FD, W3FV, N3VV, N3AMK, WB2YOF, KB3GJ. **W3LPL** & AI3M, K3DI, K3RA, K3EST, WD4AXM, K3RV, KT4W, WA3UXU. **W3NX** & AD3V, N8NA. **W6XX** & W6TPH, AE6U, N6QW, 4X4WN, N6TH, K6TMB, N6DOK, W6CF, K6HNZ. **WØAIH** & WAØRBW, KØFVF, NØNO, KØTG, NØBIH, KMØO, WØRIF. **ZK2RU**: K6RU, AA6AD, W6VG.

Operators of YW5A: (standing, left to right) John, YV5AAQ; Ray, DL2GG; Billy, YV5ANE; Edwin, YV5HUJ; Mike, YV5AAZ; Hermes, YV5DFI; Piti, YV5NN; Mauricio, YV3BDQ; (front, left to right) Jorge, YV4BMV, and son; Ali, YV2BE; Napo, YV5BNR; and Joe, YV5ANT.

U.S.A. Club Scores

Northern California Contest Club	160,376,446
Yankee Clipper Contest Club	159,837,851
Frankford Radio Club	155,503,310
Potomac Valley Radio Club	70,587,887
North Texas Contest Club	27,056,996
San Diego DX Club	19,767,727
Murphys Marauders	19,726,822
Mad River Radio Club	19,030,623
Ill-Wind Contesters	15,278,585
Southern California DX Club	14,818,780
Southeastern DX Club	14,578,462
Northern Illinois DX Association	10,981,070
Texas DX Society	10,102,624
Williamette Valley DX Club	8,654,889
Eastern Iowa DX Association	8,418,034
Rubber Circle Contest Club	8,322,335
Greater Milwaukee DX Association	7,407,480
Kansas City DX Club	5,146,050
Central Virginia Contest Club	5,049,640
Northern Ohio A.R.S.	4,989,705
Albuquerque DX Association	3,661,073
Michigan DX Association	3,608,046
Northern California DX Club	3,554,105
Vulcan DX Club	3,364,102
Central Arizona DX Association	3,287,775
Northern Ohio DX Association	3,138,514
Colorado Contest Conspiracy	2,994,662
Alamo DX Amigos	2,962,474
Western Washington DX Club	2,753,681
Neenah-Menasha A.R.C.	2,478,717
Rochester DX Association	2,270,349
Sheboygan County DX Association	2,047,596
Gloucester County A.R.C.	1,931,336
Lynchburg A.R.C.	1,908,092
Northern Florida A.R.S.	1,829,554
Mississippi Valley DX and Contest Club	1,735,452
DX Association of Connecticut	1,333,377
Meridan A.R.C.	1,311,858
Hart House A.R.C.	1,305,985
Southwest Ohio DX Association	1,286,995
Northern Florida DX Association	1,027,598
Montgomery A.R.C. (MD.)	882,283
Long Island DX Association	784,397
Four Lakes A.R.C.	758,424
Redwood Empire DX Association	566,927
Kansas City DX Association	533,849
Red Stick DX Association	443,457
Dauberville DX Association	237,267
BARRA (Buffalo, NY)	232,773
Eastern Michigan A.R.C.	211,564
Central Iowa Radio Amateur Society	190,126
Mid-Ohio Valley A.R.C.	180,328
Cuyahoga Falls A.R.C.	75,872

DX Club Scores

Lithuanian Contest Group	22,685,926
Voroshilovgrad Radio Club	19,432,964
Kaunas Polytechnic Institute R.C.	19,336,688
Southern German DX Group	17,578,259
YU DX Club	14,258,804
Halifax A.R.C.	10,708,702
Rhein Ruhr DX Association	9,649,907
Alaska DX Association	9,213,800
The Bullmertz (Sweden)	8,769,208
Ontario Contest Club	8,469,309
Tallinn Radio Club	7,731,089
Fraser Valley DX Club	7,379,093
CW YV Club	5,625,000
Israel DX Club	4,199,232
Marianas Amateur Radio Club	2,932,220
Northern Lithuania DX Group	2,851,453
Saar Pfalz DX Club	2,386,318
Danish DX Group	1,924,050
A.S. Filaret DX (Romania)	1,782,274
Groupo Argentino de Radiotelegraphia	1,771,479
SP DX Club	685,857
ES DX Club (Poland)	268,447
ZSTC (Ukraine)	143,728
Szkolny Club (Poland)	107,739
SP6PAZ Club	53,390
"Iskra" Krzeszowice (Poland)	52,770

Addendum: The Kansas City DX Club in the 1980 Contest was credited with a score of 2.9 MEG points, but actually the score should have been 8.1 MEG due to the omission of the Multi-Multi Phone score from ABØI. We apologize for this mistake.

C.W. TROPHY WINNERS AND DONORS

SINGLE OPERATOR, ALL BAND

World

Martti Laine, CT3BZ

Donor: Albert Kahn, K4FW (W2AB Memorial)

World—QRPp

Ted van Beek, AC2U

Donor: Gene Walsh, N2AA

U.S.A.

Willard L. Myers, K1GQ

Donor: Frankford Radio Club

Canada

Jim Roberts, VE3IY

Donor: Canadian DX Association

Carib./C. A.

Ivan R. Belvis, Jr., WP4BDS

Donor: Jim Neiger, N6TJ

Europe

Al Slater, G3FXB

Donor: Edward Bissell, W3AU

Africa

FR0GGL

Donor: Gordon S. Marshall, W6RR

Asia

Alexander Nicolaevich Karamian, UF6CR

Donor: Japan CQ Magazine

Japan

T. Aoyama, JA1IDY

Donor: Palm Garden Contest Club

Oceania

Thomas H. Schiller, N6BT/AH0

Donor: Maui Amateur Radio Club

SINGLE OPERATOR, SINGLE BAND

World

Jorge Humberto Bozzo, LU8DQ (21 MHz)

Donor: W2JT Memorial, No. Jersey DX Assoc.

World—3.5 MHz

Francesco Chiodini, I4IND

Donor: Fred Capossela, K6SSS

U.S.A.

Stephen F. Biddle, K6EWL (21 MHz)

Donor: No. Illinois DX Association

Canada

Kari Korhonen, VE1BRB (14 MHz)

Donor: Canadian Amateur Radio Federation

Carib./C.A.

Isaac Novoa-Lopez, NP4DA (21 MHz)

Donor: DX Club of Puerto Rico

Europe—14 MHz

Markku Nyyssonen, OH8SR

Donor: G2LB Memorial (From Friends)

South America

Franklyn Brooker, 9Y4VU (28 MHz)

Donor: Rafael Ponce de Leon, CX3BR

MULTI-OPERATOR, SINGLE TRANSMITTER

World

P41E (Oprs. K4BAI, N4TO, W6OAT, K3NA, K0OO)

Donor: Anthony Susen, W3AOH

U.S.A.

N1AC (Oprs. N1AC, W1IHN, K1UO)

Donor: Douglas Zwiebel, KR2Q

MULTI-OPERATOR, MULTI-TRANSMITTER

World

W2PV (Oprs. K1DG, K1JX, KA1R, KC1Q, N2NT, WA2SPL, K2SX, K2XA, K3UA, WA3ZAS

Donor: Hazard Reeves, K2GL

U.S.A.

N2AA (Oprs. K2GL, K2BQ, K2NG, K2GM, K2TW, K2SS, K2TT, KR2J, KR2Q, KR2W, KU2M, K5NA)

Donor: James Rafferty, N6RJ

CONTEST EXPEDITIONS

World—Single Operator

SU1AA (Opr. Ville Hiilesmaa, OH2MM)

Donor: Yankee Clipper Contest Club

World—Multi-Operator

ZK2RU (Oprs. K6RU, AA6AD, W6VG)

Donor: Bill Schneider, K2TT

SINGLE OPERATOR—ALL BAND

World—Phone/CW Combined

Martti Laine, OH0BH/CT3BZ

Donor: John Knight, W6YY

CLUB TROPHIES

World—Phone/CW

Northern California Contest Club 160,376,446

Donor: CQ Magazine

MOST IMPROVED—PHONE/CW

Northern California Contest Club

Donor: Southeastern DX Club

WORLD TOP 10 QRPp

(5w input)

All Band

1. AC2U 591,856
2. N3RS 577,205
3. UP2BFC 441,881
4. OK2PDL 321,984
5. K4LTA 281,082
6. N4BP 268,832
7. AJ7S 267,544
8. VE3KZ 261,632
9. HP1XAT 253,215
10. DF4RD 220,712

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSO's, Zones, and Countries. Certificate winners are listed in Bold Face.

C.W. RESULTS
SINGLE OPERATOR
NORTH AMERICA

UNITED STATES

K1GQ	**A**	**3,276,768**	**2111**	**138**	**390**	
K1KI	"	**3,169,751**	**2044**	**132**	**401**	
K1AR	"	**2,916,822**	**2003**	**130**	**371**	
W1KM	"	**2,628,120**	**2034**	**121**	**319**	
W1DA	"	1,748,810	1442	116	299	
W1PH	"	1,581,306	1298	105	314	
W1ZT	"	1,323,084	1177	110	289	
W1RR	"	1,289,148	1093	115	297	
K1SA	"	1,178,532	1208	96	246	
W1FJ	"	947,076	973	89	249	
KG1E	"	851,390	922	93	223	
AI1E	"	548,386	740	76	178	
AB1U	"	480,896	589	83	208	
K1IK	"	368,460	468	89	187	
W1NG	"	368,368	448	105	194	
K1JB	"	344,796	544	72	164	
W0MHK/1	"	258,120	434	68	148	
K1BV	"	227,664	514	45	108	
W1CNU	"	175,062	300	52	127	
W1LQQ	"	162,985	340	54	131	
K1FWF	"	157,094	166	68	161	
AD1F	"	132,396	267	54	123	
W1IUU	"	117,465	228	60	131	
N1AU	"	107,200	234	52	108	
W1HUE	"	89,708	205	52	112	
KA1FGH	"	86,394	255	32	87	
WA1NRT	"	81,515	210	41	96	
W1HX	"	77,832	151	61	123	
KA1CLV	"	70,785	176	48	95	
KD1U	"	56,529	201	27	72	
KB1U	"	45,864	152	35	69	
KA1CY	"	37,922	102	51	83	
K1VHS	"	27,141	92	37	72	
W1OPJ	"	11,350	76	15	35	
W1PLJ	"	6,216	53	15	27	
W1WAI	**28**	**292,125**	**801**	**30**	**95**	
KA1CFC	"	201,135	605	27	88	
N1BHL	"	57,482	245	22	60	
KA1EHR	"	3,136	44	11	21	
W1GNR	**21**	**217,002**	**636**	**32**	**86**	
WA1FCN	"	191,646	557	30	87	
W1END	"	50,072	198	28	60	
K1VWL	"	39,809	185	23	54	
K1EFI	**14**	**172,099**	**526**	**31**	**82**	
KA1BTF	"	10,971	74	16	37	
K1MA	**7**	**215,424**	**719**	**24**	**78**	
AA1M	"	37,530	197	17	53	
W1BWS	"	9,374	77	10	33	
W1ZM	**3.5**	**151,497**	**610**	**22**	**71**	
			(Opr. K1ZM)			
K1PBW	**1.8**	**6,160**	**61**	**17**	**27**	
K1MEM	"	5,964	65	14	28	
W1BB/1	"	1,533	25	8	13	
K2VV	**A**	**2,783,920**	**2079**	**118**	**342**	
W2REH	"	**2,777,236**	**1857**	**135**	**373**	
N2LT	"	**2,768,157**	**2135**	**118**	**323**	
W2VJN	"	**2,374,930**	**1554**	**142**	**388**	
AE2A	"	2,227,357	1653	123	350	
W2GD	"	2,171,310	1630	126	335	
W2IB	"	2,128,475	1560	127	348	
KQ2M	"	1,784,727	1427	120	321	
K2BU	"	1,692,186	1399	112	305	
W2TA	"	1,517,820	1278	112	298	
W2YC	"	1,217,200	1067	104	296	
W2GGE	"	951,709	915	90	269	
K2NJ	"	921,284	882	103	261	
N2JJ	"	850,698	897	95	239	
W2TZ	"	752,740	858	82	223	
K2QF	"	738,390	796	105	221	
N2UN	"	708,671	761	91	240	
N2DT	"	701,244	774	87	215	
KF2O	"	567,056	613	89	243	
N2MR	"	473,224	569	88	210	
K2PA	"	470,470	599	84	202	
W2FTY	"	393,104	444	96	215	
KK2E	"	351,671	540	60	163	
W2IY	"	301,158	388	85	201	
W2GKZ	"	291,510	434	72	174	
W2AYJ	"	281,441	438	69	159	
K2GHV	"	270,572	535	53	120	
KB2XZ	"	222,768	344	72	166	
N2AIF	"	212,898	336	68	154	
AC2K	"	173,880	459	38	97	
K2QIL	"	159,960	329	51	121	
K2SHL	"	154,470	294	58	132	
WA2ORX	"	148,887	256	75	138	
W2GUP	"	142,677	251	48	143	
WA2LJM	"	141,328	277	56	120	
KQ2N	"	132,129	297	49	110	
W2PHT	"	114,924	242	52	105	
K2RD	"	111,540	237	54	115	
KB2NU	"	67,045	200	37	78	
W2DW	"	56,980	147	52	88	
K2YGM	"	47,946	151	44	78	
KA2IRR	"	45,632	198	43	81	
KS2C	"	35,518	119	45	73	
W2HL	"	24,656	98	40	52	
N2BNB	"	20,460	82	32	61	
KA2IBT	"	18,392	88	26	50	
W2XQ	"	9,246	48	28	41	
KA2FEW	"	4,005	95	20	25	
N2AWH	"	2,143	50	15	13	
KA2IWK	"	1,674	50	17	14	
N2IN	"	900	17	8	12	
K2MFY	**28**	**89,001**	**327**	**26**	**67**	
KA2MNJ	"	27,090	135	21	49	
N2AU	**21**	**406,640**	**1021**	**35**	**101**	
WA2HZR	"	195,536	560	33	88	
WA2LOG	"	105,576	348	29	77	
W2RPZ	"	33,884	141	28	58	
KA2LEB	"	29,260	133	25	52	
K2MN	14	2,212	27	9	19	
W2KHQ	**7**	**23,232**	**129**	**17**	**47**	
WA2SQY	"	18,240	112	17	43	
K2LP	**3.5**	**12,960**	**88**	**14**	**40**	
N3AD	**A**	**2,481,507**	**1943**	**119**	**322**	
K4PQL/3	"	**2,250,039**	**1711**	**121**	**330**	
N3BB	"	**2,168,530**	**1641**	**123**	**332**	
K3OO	"	**2,046,268**	**1641**	**119**	**309**	
W3AP	"	1,738,954	1346	125	321	
N3ED	"	1,564,620	1214	118	327	
K3VW	"	1,398,768	1313	101	267	
K3WJV	"	1,328,601	1396	88	239	
K3WW	"	1,277,684	1148	108	280	
N3RG	"	1,160,220	1092	105	261	
W3MA	"	981,120	996	91	245	
K3ZZ	"	898,068	787	107	295	
N3AM	"	824,250	857	100	250	
W3UJ	"	797,818	801	101	242	
W3GN	"	761,560	850	94	222	
K3TC	"	743,566	730	102	256	
W3GU	"	723,142	764	99	230	
K3II	"	717,570	750	92	243	
N3HW	"	572,460	852	65	170	
W3ARK	"	539,939	721	75	188	
W3AZ	"	534,786	628	85	209	
W3KT	"	469,500	529	93	220	
K3OX	"	442,380	539	81	211	
K4JLD/3	"	421,627	511	91	202	
KC3H	"	414,187	611	76	163	
W3EVW	"	393,900	435	108	217	
W3KV	"	354,006	454	83	194	
W3GK	"	335,652	471	73	176	
KA3R	"	318,588	421	85	193	
W3GL	"	315,018	428	71	187	
K3NL	"	296,144	461	65	158	
W3ICM	"	277,777	459	78	151	
W3FG	"	264,967	373	75	182	
K3NZ	"	260,047	433	65	144	
W3GRS	"	249,760	319	80	200	
K3UC	"	205,252	365	59	135	
K3JGJ	"	195,620	326	64	144	
WB3FSB	"	178,020	307	63	144	
WA3SZY	"	147,573	309	53	118	
N2MA/3	"	146,848	241	83	125	
W3HDH	"	130,640	252	61	123	
K3IE	"	118,192	234	54	124	
WA3IMY	"	110,230	267	48	103	
KA3CRC	"	106,386	253	45	104	
W3GNQ	"	100,080	210	56	124	
W3HVM	"	99,593	223	54	109	
N3NA	"	98,436	233	54	102	
AJ3H	"	52,138	143	46	85	
K3KNH	"	49,176	181	41	85	
WB3JRU	"	40,770	153	48	87	
WB3CAC	"	26,712	109	32	52	
WB3KIL	"	3,577	35	22	27	
N3BJ	**28**	**165,540**	**478**	**30**	**94**	
KA3BFX	"	101,442	337	28	78	
W6GMZ/3	"	64,246	246	25	66	
WA3DMH	"	8,648	64	12	34	
K3TW	**21**	**207,179**	**603**	**31**	**88**	
KC3N	"	97,643	389	26	65	
SM0KV/W3	"	60,260	205	28	67	
WA3JXW	"	9,984	75	17	31	
K3FN	**3.5**	**34,100**	**168**	**17**	**58**	
K3TG	"	18,282	116	17	51	
AA1K/3	**1.8**	**2,646**	**53**	**10**	**17**	
LA4LN/W3	"	275	39	5	6	
W4RX	**A**	**1,957,137**	**1528**	**128**	**341**	
K7SV/4	"	**1,835,541**	**1383**	**125**	**334**	
N4UA	"	1,253,448	1169	104	274	
W4YE	"	999,544	955	105	259	
K4AMC	"	775,838	898	91	211	
AA4M	"	750,300	875	89	211	
N4MO	"	605,730	669	98	233	
W4NTI	"	482,296	541	97	237	
N6AV/4	"	465,055	505	96	235	
W4BV	"	435,891	479	98	229	
W6OKX/4	"	391,741	457	81	212	
W4RW	"	376,600	485	76	204	
K4RZ	"	372,788	488	81	187	
W4EI	"	298,818	458	67	167	
N4CD	"	244,080	366	73	167	
N4QB	"	227,683	384	69	154	
K4PB	"	220,101	355	67	157	
KU4J	"	180,318	272	78	168	
N4MM	"	169,295	251	80	165	
K4OD	"	165,783	279	74	145	
K0CMF/4	"	156,384	255	66	150	
W4KFC	"	111,910	249	46	109	
KC4FD	"	71,050	180	44	101	
N4EDX	"	68,080	163	49	99	

TOP SCORES

WORLD

Single Op All Band

9Y4VT	5,803,776
CT3BZ	5,701,590
HK3A	4,478,204
N6BT/AH0	4,241,746
UF6CR	4,101,936
8P6J	3,868,716
K1GQ	3,276,768
K8LX	3,270,780
K1KI	3,169,751
EA2IA	3,057,204

Single Op Single Band

28 MHz

YJ8RW	612,255
OH3XZ	546,360
DL1BU	509,878
YT3L	484,120
YU3EW	466,570
JH1EDD	462,070

21 MHz

LU8DQ	1,359,711
YU3ZV	732,096
DK3GI	714,280
VE3BMV	653,856
YU7OCV	459,801
K6EWL	454,648

14 MHz

OH8SR	672,600
SM0AJU	560,324
KG6DX	525,420
SM2CEW	479,820
UA9ADQ	447,874
W8UVZ	368,382

7 MHz

UA1DZ	339,532
K0RF	337,280
AB0I	335,775
YU4AW	287,538
UB5JMR	241,440
JE3MCC	240,700

3.5 MHz

I4IND	172,782
W1ZM	151,497
UC2ACA	136,394
DJ2BW	130,974
UA9TS	122,567
YU2RA	109,755

1.8 MHz

EA8AK	41,470
YV1OB	25,806
GW3NYY	21,320
OK3KFF	19,764
4X4NJ	18,252
UA9SAX	17,480

Multi-Op Single Transmitter

P41E	8,059,296
YU3EY	7,674,190
YW5A	5,481,975
R5I	4,892,184
N4AR	4,564,350
UK2PCR	4,512,285

Multi-Op Multi-Transmitter

W2PV	10,431,729
N2AA	10,147,820
W3LPL	9,628,026
OH3AA	9,301,635
K2UA	9,210,792
N9MM	8,884,400

USA

Single Op All Band

K1GQ	3,276,768
K8LX	3,270,780
K1KI	3,169,751
N5AU	2,977,424
K1AR	2,916,822
K2VV	2,783,920
W2REH	2,777,236
N2LT	2,768,157
W1KM	2,628,120
K9DX	2,624,064

Single Op Single Band

28 MHz

N4ZC	382,782
W0UA	376,248
W0ZV	347,520
W8WPC	324,324
K0ZZ	323,342
N4ZZ	315,126

21 MHz

K6EWL	454,648
N2AU	406,640
K4VX/0	397,764
K8CX	358,912
K9QVB	337,410
W0KEA	306,125

14 MHz

W8UVZ	368,382
K9PPY	350,908
K0ZX	327,228
W9OA	315,315
N8CC	280,250
W9NUD	277,536

7 MHz

K0RF	337,280
AB0I	335,775
W9VNE/8	230,690
K1MA	215,424
K4PI	181,888
WD9IIX	133,118

3.5 MHz

W1ZM	151,497
N4UM	35,440
K3FN	34,100
N5CR	30,355
K3TG	18,282
WD9AHJ	13,851
N7RM	13,604

1.8 MHz

W8LRL	8,234
K1PBW	6,160
K1MEM	5,964
N4IN	5,418
K5UR	4,477
K6SE	3,496

Multi-Op Single Transmitter

N4AR	4,564,350
N1AC	4,149,032
W3BGN	3,930,997
K1XA	3,444,246
N4RJ	3,362,446
W4NL	3,253,040

Multi-Op Multi-Transmitter

W2PV	10,431,729
N2AA	10,147,820
W3LPL	9,628,026
K2UA	9,210,792
N9MM	8,884,400
K1ZZ	8,758,260

W4YN	"	56,682	150	46	88
N4FGF	"	52,200	173	42	78
WA4DRU	"	41,580	117	41	91
W9TS/4	"	34,963	111	48	76
K4FPF	"	24,459	92	32	61
W4OGG	"	22,714	100	33	49
W4DGJ	"	17,225	99	20	45
N4ZC	**28**	**382,782**	**1018**	**32**	**99**
N4ZZ	"	**315,126**	**922**	**32**	**91**
WB4TDH	"	223,971	636	31	90
AA4AK	"	201,662	590	30	88
K4JSI	"	56,494	211	23	71
K4GNP	"	24,600	136	21	54
W4GTS	"	20,230	106	21	49
K4II/4	"	5,670	54	14	31
W4IQ	"	3,168	36	11	21
N4BU	**21**	**217,695**	**686**	**31**	**84**
K4XL	"	174,585	534	30	83
K4HCY	"	89,670	324	28	70
W4JD	"	54,472	217	26	62
KA4RLP	"	12,103	97	20	29
W3YY/4	**14**	**176,202**	**533**	**32**	**85**
W4AAV	14	152,460	460	33	88
N4WQ	"	109,545	387	30	79
N4CT	"	60,260	230	25	67
W4KMS	"	23,870	111	20	57
W4NM	"	4,440	44	13	24
K4PI	**7**	**181,888**	**556**	**28**	**88**
KG4W	"	93,177	379	24	63
W4VQ	"	56,430	219	23	67
WA4SVO	"	53,222	231	23	66
N4OT	"	22,997	137	15	46
N4UM	**3.5**	**35,440**	**175**	**20**	**60**
N4SU	"	10,945	72	16	39
N4IN	**1.8**	**5,418**	**57**	**14**	**29**
W4DR	"	3,298	45	13	21
W4PZV	"	1,200	25	9	15
N4ARO	"	700	19	8	12
N5AU	**A**	**2,977,424**	**2089**	**142**	**349**
			(Opr. K5ZD)		
K5GA	"	**2,434,864**	**1697**	**142**	**354**
N5JJ	"	**2,042,482**	**1618**	**130**	**312**
K5KU	"	1,591,370	1432	121	286
K5NW	"	1,375,617	1166	123	288
N5JB	"	1,161,981	1064	116	253
AD5Q	"	776,298	851	101	226
K5LP	"	706,982	825	92	210
W5DV	"	620,366	714	99	214
KA5W	"	568,176	667	95	209
WA5SOG	"	493,190	601	97	201
K5KLA	"	464,648	684	73	168
K5DB	"	347,415	504	100	165
W5BE	"	273,969	440	74	145
W5OSJ	"	271,508	478	72	134
KS5A	"	240,189	495	59	118
KQ5A	"	164,630	349	48	115
WB5TEQ	"	118,475	246	61	114
KM5G	"	99,116	255	43	99
W5QF	"	73,304	194	48	88
W5JC	"	47,570	134	48	86
W5EIJ	"	40,208	142	42	70
KA5Q	"	30,530	130	27	59
W5YH	"	27,560	93	34	70
N5UA	"	14,076	74	25	43
W5XZ	**28**	**308,238**	**889**	**30**	**93**
N5JW	"	296,582	839	30	92
N5TP	"	264,125	750	27	98
AF5M	"	225,459	651	32	91
WB5YOT	"	117,484	449	25	67
N5CDO	"	95,772	365	24	68
K5RF	"	31,350	149	19	56
W5ASP	"	22,081	113	20	51
WB5DDI	**21**	**137,690**	**554**	**28**	**70**
K5SF	"	118,674	359	33	81
AC5R	"	22,011	114	23	46
KB5YY	"	16,744	114	18	34
W5FO	**14**	**238,243**	**628**	**34**	**103**
K2SCU/5	"	3,842	39	12	22
K9MK/5	**7**	**40,068**	**173**	**24**	**60**
N5CR	**3.5**	**30,355**	**182**	**19**	**46**
N0IN/5	"	6,600	64	15	25
K5BZU	"	2,697	42	10	19
K5UR	**1.8**	**4,477**	**72**	**15**	**22**
K6NA	**A**	**1,639,820**	**1268**	**141**	**314**
N6GG	"	**1,078,836**	**1039**	**110**	**253**
N6AR	"	**903,033**	**856**	**119**	**254**
W6MSF	"	847,658	935	100	217
			(Opr. WA6HCI)		
N6ZZ	"	809,723	792	110	251
W6SX	"	772,740	1016	86	184
W6KUT	"	728,466	848	109	208
N6JV	"	695,872	746	114	218
W6OKK	"	675,272	784	99	203
W6ISQ	"	651,002	703	102	224
N2YO/6	"	634,644	778	103	186
N6AN	"	592,764	742	96	186
N6QR	"	498,645	571	102	213
W6NKR	"	416,295	458	102	217
KD9E/6	"	416,245	515	95	200
K6PU	"	379,490	495	100	174
WB6JMS	"	364,694	488	98	176
WD6EWG	"	283,504	512	72	136
WB6FDQ	"	268,056	437	82	134
W6WB	"	247,296	350	83	173
K6OMB	"	242,844	440	73	123
WA6HAE	"	224,928	369	74	139
AD6D	"	221,832	366	79	137
W6BYH	"	208,458	316	73	149
N6ZB	"	207,336	460	63	100
WA6LFF	"	200,026	237	72	134
N6NF	"	171,437	452	50	83
N6HK	"	170,753	285	69	140
KG6O	"	152,471	273	65	102
K6DR	"	131,520	344	52	85
K6LAN	"	122,472	271	59	103
WB6KBZ	"	117,735	309	52	89
			(Opr. WB6PYI)		
N6HR	"	117,096	211	72	132
N6OZ	"	115,456	251	58	106
N6UW	"	107,008	264	63	89
W5FL/6	"	89,206	221	55	91
K6MA	"	81,760	221	60	86
W6MFC	"	78,736	248	40	72
KS6H	"	76,608	278	50	64
N6JM	"	76,038	201	57	81
W6OUL	"	69,960	208	47	85
WB6EXW	"	69,580	184	58	82
K6YRA	"	56,696	119	54	98
			(Opr. AE6P)		
N6ESV	"	44,322	191	31	52
AA6DP	"	40,670	148	41	57
W6SYL	"	33,957	160	29	48
W6EYC	"	32,926	113	36	65
AC6H	"	27,528	141	34	40
WA6TKT	"	26,329	92	51	62
N6CT	"	20,995	112	22	43
N6EZN	"	17,613	120	22	35
K6SMH	"	15,680	77	37	43
W6SZ	"	15,124	69	26	50
W6QDE	"	11,210	68	25	34
KA6ING	"	4,140	39	23	22
KB6ZA	"	1,032	22	11	13
WA6HAD	"	836	50	10	9
KA6QXG	"	297	13	6	5
K6OZL	**28**	**207,805**	**634**	**31**	**84**
W6TMD	"	84,300	293	27	73
K6EWL	**21**	**454,648**	**1140**	**35**	**101**
N6TO	"	96,642	385	27	64
K6VL	"	76,512	278	29	67
K9WYI/6	"	30,660	173	21	39
WA6VNR	"	20,764	129	21	37
W6PU	**14**	**154,488**	**436**	**33**	**90**
KA6DSW	"	56,052	247	24	57
K6XT	"	25,488	122	26	46
W6HJ	"	19,924	106	23	45
W6YA	**7**	**133,038**	**408**	**31**	**83**
W6AM	"	126,222	402	29	80
			(Opr. N6AW)		
NF6S	"	53,448	285	22	46
W6US	**3.5**	**9,288**	**110**	**14**	**22**
K6SE	**1.8**	**3,496**	**92**	**11**	**12**
K6MO	"	1,020	31	8	7
W6RR/7	**A**	**1,780,800**	**1488**	**129**	**291**
W7IR	"	**1,304,784**	**1035**	**128**	**314**
K7ZA	"	844,474	936	104	209
KN7Y	"	576,104	979	73	129
W7JYW	"	358,234	626	69	137
K7OEW	"	334,262	612	74	120
K7LAY	"	275,808	462	69	139
W7IIT	"	262,800	459	65	135
KC7EH	"	228,272	467	64	112
N7MW	"	214,020	321	87	159
W7LGG	"	175,560	291	67	143
W7TC	"	156,864	383	57	95
K7NF	"	151,938	383	53	85
W7FGT	"	57,989	192	39	64
W7AYY	"	55,300	195	40	60
W7JKA	"	47,498	138	51	76
N7EA	"	45,936	176	25	62
KD7H	"	40,470	211	23	48
K7WA	"	38,402	153	36	55
K7CPC	"	37,288	163	32	47
KB7G	"	18,113	120	26	33
K7RI	**28**	**269,986**	**766**	**33**	**89**
			(Opr. W7WA)		
WA7UEC	"	134,680	541	27	64
W7ZMD	"	61,115	261	22	63
W7KRM	"	8,190	74	15	24
N7RO	**21**	**214,256**	**677**	**32**	**80**
K7NO	"	186,864	646	28	74
W7ZI	"	63,008	249	25	63
K7FC	"	14,958	96	19	35
K7TTZ	"	6,370	67	13	22
W7KKR	**14**	**48,872**	**202**	**23**	**59**
N7ES	"	26,040	156	21	39
N7AM	"	21,672	107	26	46
K7ABV	**7**	**66,502**	**275**	**21**	**61**
K7UR	"	35,196	148	25	59
N7RM	**3.5**	**13,604**	**139**	**16**	**22**
K7WQD	"	2,904	49	10	12
WB7FOQ	**1.8**	**2,160**	**47**	**9**	**9**
K0PP/7	"	1,926	45	9	9
KG7D	"	1,312	65	8	8
K8LX	**A**	**3,270,780**	**2295**	**127**	**359**
WA8YVR	"	**2,561,316**	**1908**	**130**	**331**
N8II	"	**2,346,724**	**1897**	**115**	**313**
K8NZ	"	2,306,772	1672	129	348
K8GL	"	1,567,040	1314	114	301
W8UA	"	1,462,335	1265	112	287
KO8T	"	1,332,212	1360	98	245
K8SS	"	1,262,334	1191	104	262
WB8JBM	"	727,542	1055	66	177
			(Opr. WD8IJP)		
N8BJQ	"	683,892	774	94	220
KQ8M	"	634,330	819	84	193
KK8J	"	401,136	499	77	197
KC8C	"	364,896	458	92	196
N8TN	"	316,540	469	76	169
W8GOC	"	310,994	420	81	181
W8KUK	"	271,800	469	62	138
N8BC	"	269,075	402	73	162
K8BA	"	241,155	375	72	161
KE8M	"	225,982	396	63	143
K8SIA	"	214,635	383	59	146
K8OQL	"	180,692	339	74	153
K8AC	"	172,480	258	86	159
KD8V	"	145,518	343	52	106
WD8IXE	"	118,096	250	51	125
N8MK	"	104,490	231	57	105
WB8TRW	"	102,384	224	47	115
K8WW	"	88,290	215	52	110
K8HF	"	79,404	190	54	102
W8UPH	"	71,247	201	42	85
K8CV	"	71,120	192	46	81
KI8B	"	64,260	217	28	74
W8YGR	"	51,842	119	60	101
KA8FHB	"	33,759	148	40	59
K8KR	"	24,219	121	27	42
WA8WMC	"	14,616	90	28	44
KA8DDZ	"	12,915	73	25	38
KC8E	"	2,880	29	16	24
W8WPC	**28**	**324,324**	**895**	**31**	**95**
			(Opr. N9AG)		
WA8DXB	"	222,015	621	29	94
W8TWA	"	196,091	627	28	81
N8BKO	"	62,694	248	24	62
KA8IGM	"	41,400	160	24	68
W8WVU	"	4,810	50	16	21
KA8MSU	"	3,720	44	8	23
W8YL	"	3,240	47	13	17
K8CX	**21**	**358,912**	**990**	**34**	**94**
K8JLB	"	125,350	386	35	80
KC8JH	"	4,553	54	12	17
KA8JQX	"	20	2	2	2
W8UVZ	**14**	**368,382**	**857**	**38**	**109**
N8CC	"	280,250	816	33	85
WD8AUB	"	216,916	611	34	88
WB8KKI	"	187,074	582	30	84
W8QWI	"	155,226	441	32	91
KA8IPL	"	54,485	232	27	58
K8EF	"	42,856	176	26	62
KA8DJZ	"	41,990	169	23	62
N8XE	"	17,928	147	16	38
W9VNE/8	**7**	**230,690**	**699**	**30**	**85**
WA8UQK	"	52,777	211	23	66
K8CC	"	12,688	76	20	41
WD8QBP	**3.5**	**8,132**	**83**	**11**	**27**
W8LRL	**1.8**	**8,234**	**89**	**17**	**29**
K8MN	"	1,240	45	9	11
WA8LXJ	"	960	29	8	8
K8BTH	"	774	24	9	9
K9DX	**A**	**2,624,064**	**1913**	**126**	**348**
AI9J	"	**1,732,590**	**1249**	**130**	**356**
K9BN	"	**1,102,608**	**1110**	**93**	**249**
W9OP	"	945,770	1109	88	207
K9TUS	"	830,067	872	96	233
KE9A	"	618,309	708	94	215
W9RN	"	350,840	454	86	194
K9JU	"	347,693	452	79	192
AK9Z	"	297,024	443	67	171
N9AEJ	"	284,280	450	75	155
K9IW	"	261,905	379	75	170
W9GXR	"	256,256	451	62	146
KB9XG	"	236,811	424	57	136
K9MDO	"	184,288	316	66	142
AG9S	"	177,354	374	46	121
K9YAX	"	133,266	289	51	116
K9RA	"	114,663	360	28	83
KA9ACS	"	77,112	221	45	74
W9QWM	"	76,500	180	48	102
N9AW	"	65,860	175	46	102
WB9RNF	"	55,200	166	40	80
W9TNZ	"	45,756	132	41	83
K9GDF	"	37,368	194	21	51
W9REC	"	31,191	100	44	67
K9BIL	"	22,932	95	25	59
K9MFI/M	"	16,416	96	37	59
W9YDP	"	8,100	58	19	31
K9BQL	"	2,044	25	10	18
WA9CYG	"	1,682	20	11	18
K9RN	**28**	**191,418**	**539**	**31**	**91**
W9YYG	"	173,760	506	31	89
W9DWQ	"	152,490	411	32	98
W9WAQ	"	124,542	388	28	83
W9GIL	"	94,276	330	22	76
WA9MAG	"	89,001	333	27	66
K9QVB	**21**	**337,410**	**838**	**36**	**102**
W9NGA	"	127,020	375	34	82
WB9HYA	"	3,572	53	14	24
K9PPY	**14**	**350,908**	**806**	**37**	**111**
W9OA	"	315,315	748	38	109
W9NUD	"	277,536	798	32	86
KC9T	"	237,336	710	31	85
KJ9D	"	184,356	608	26	82
K9PQG	"	163,229	467	31	90
KK9A	"	21,600	105	27	48
WD9IIX	**7**	**133,118**	**463**	**27**	**74**
WA9EKA	"	85,786	264	29	89
W9CH	"	66,588	252	25	68
K9AB	"	44,720	180	21	65
K9DAF	"	33,360	148	21	59
N9ER	"	11,960	69	19	46
K9QXY	"	645	16	6	9
WD9AHJ	**3.5**	**13,851**	**99**	**16**	**41**
K9KM	"	8,832	75	15	33
W9CG	**1.8**	**1,536**	**31**	**9**	**15**
W8WP	**A**	**1,605,932**	**1430**	**112**	**276**
N4RR/8	"	**1,547,946**	**1295**	**122**	**292**
N2IC/0	"	1,497,428	1441	114	247
W0HP	"	1,208,213	1050	116	285
K0FX	"	1,009,944	1039	108	224
KD0Q	"	843,630	811	107	259
K0LUZ	"	570,984	683	89	207
W0IUB	"	451,806	630	81	176
AK0M	"	341,936	434	87	197
AG0A	"	263,442	367	83	166
WA2CNF/0	"	142,284	311	54	113
K9BLY/0	"	142,116	311	55	101
W0VX	"	88,060	217	53	95
AB0X	"	86,686	180	68	110
W0YBV	"	60,066	243	26	68
N0CKC	"	57,953	177	47	72
WB0ISW	"	52,540	143	56	86
KM0R	"	48,645	152	44	71
K0IFL	"	40,766	137	37	72
N0CKS	"	39,114	134	41	65
N0BYP	"	26,664	208	18	26
KB0V	"	24,341	86	38	63
KA0P	"	21,586	94	33	53
KC0Q	"	19,796	72	37	61
KB0U	"	19,107	72	37	62
KA0IKD	"	8,932	58	25	33
W8UA	**28**	**376,248**	**1070**	**31**	**91**
W0ZV	"	347,520	927	32	96
K0ZZ	"	323,342	892	32	95
W0YK	"	299,707	956	28	79

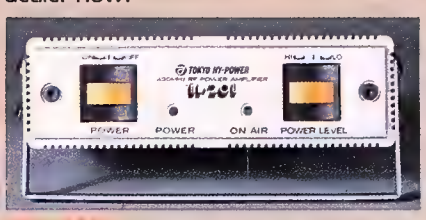
HL-32V—This Little Beauty is the first of our compact, low profile amplifiers for use with handheld radios. For VHF operations, this unit produces 10W to 25W output with drive from your 0.5W to 3W handheld. Excellent for mobile use in your car.

Turn it on with the convenient front panel controls, including Power LED and Transmit LED, or slip the package under the seat out of sight and out of mind.

Low insertion loss on receive and selectable power level design provides low VSWR to the transceiver.

Use with any talkie from 0.5W to 3W for 10W to 25W output.

The HL-32V operates linear mode for SSB or FM (switch selected), and the best news of all: the price is only $89.95 suggested retail! At your favorite dealer now!



HL-20U New Product Preview—Another super compact from Tokyo Hy-Power Labs . . . This one is for UHF, and it's beautiful, with the controls on the brushed metal face panel to make operation as easy as touch-and-go.

The ultra compact HL-20U is a basic amplifier for all UHF handheld radios, and it can accept input levels from 200mW to 3W, to produce a big 20W output signal.

Your UHF handheld operations have never experienced anything like this surprising little amplifier from Tokyo Hy-Power Labs. Price and availability of the HL-20U will be announced soon.

TOKYO HY-POWER LABS, INC.

Long the quality leader among fine Japanese communications equipment manufacturers, TOKYO HY-POWER LABS now makes these outstanding units available to you through American dealers. Now you can get our advanced features and quality at your kind of prices.

PRECISION MATCHING PAIR

Tokyo Hy-Power Labs' HC-150 tuner, with an accurate 200W 3-30 MHz power meter/VSWR bridge and sturdy, quality-built coax or wire line antenna coupler, provides smooth, precision matching from any barefoot transceiver to antenna between 10 and 200 ohms. For a most reasonable sum of $99.95.

If stompin' through the QRM at the edges of the band, where somehow the DX always seems to be, and where the VSWR usually heads for the sky, is your kind of thing; the HC-2000 is your kind of coupler. It can provide a matched antenna, while ready for both forward and reflected power at the same time on the accurate dual meter VSWR/wattmeter. At $349.95 suggested retail, the HC-2000 can handle the output resulting from the full legal limit input to your linear amplifier.

The next time you want to make a lumpy line flat or to make a long line perform as it should, use a quality built, quality performing Tokyo Hy-Power Labs antenna coupler.

TOKYO HY-POWER LABS, INC.
SAITAMA, JAPAN

Distributed by
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2000 Avenue G, Suite 800, Plano, Texas 75074
Phone (214) 423-0024 TLX 79-4783 ENCOMM DAL

CIRCLE 111 ON READER SERVICE CARD

The HD-73 Rotator by Alliance

A precision instrument built to last.

The HD-73 combines Dual-Speed rotation and a single 5-position switch with the clear visibility of a backlit D'Arsonval meter. So you get precise control for fast and fine tuning. And the advanced technology of HD-73 is backed by quality construction. Heavy duty aluminum casings and hardened steel drive gears. Lifetime factory lubrication that withstands -20°F. to 120°F. temperatures. The superior design of the HD-73 mast support bracket, with optional no-slip positive drive, assures perfect in-tower centering with no special tools. Automatic braking minimizes inertia stress. Easy to install, a pleasure to use. The HD-73 is on your wavelength. Write for performance details today.

I want to tune in on HD-73. CQ

☐ Send complete details

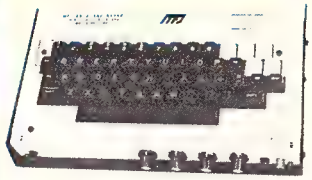
☐ Give me the name of my nearest dealer.

NAME _____

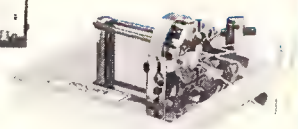
ADDRESS _____

CITY _____ STATE _____ ZIP _____

The Alliance Manufacturing Company, Inc.,
Alliance, Ohio 44601

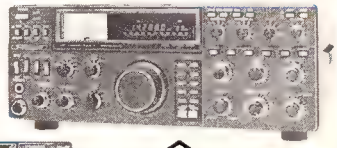


MFJ Keyboard



Bencher Paddle

Ten-Tec Omni



Trio-Kenwood 930

ICOM 740

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CIRCLE 101 ON READER SERVICE CARD

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(20 years of continuous publication)
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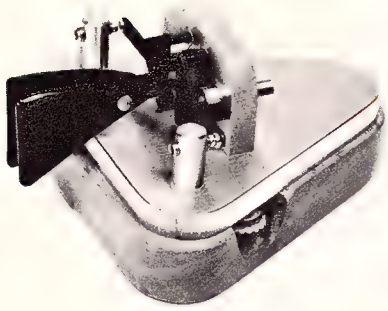
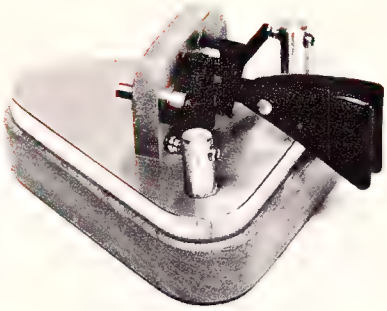
CIRCLE 92 ON READER SERVICE CARD

"Our Keys Unlock the World"





The **Brass Racer-EK-1**, look carefully, you may not notice that this paddle is also a keyer. Built into the base is a fully iambic, dot-dash insertion, and adjustable speed control keyer using the Curtis 8044 chip. Nearly invisible but a convenient, spacesaving, portable keyer/paddle unit. **Vibroplex** quality throughout.

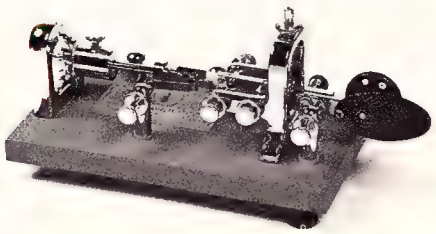
THE VIBROPLEX COMPANY INC
TRADE MARK

The **Brass Racer-Iambic**, a truly distinctive new design of iambic paddle; crafted from solid brass and mounted on a base of polished hardwood. Beautiful to look at; beautiful to operate. The paddle tension is adjustable to the operator's likes with a twist of our unique tensioning system. Just set it and forget it. A lifetime of smooth, easy operation. Experience the pride of owning a **Vibroplex**.

"we're not good because we're old; we're old because we're good"

VIBROPLEX

"the oldest name in amateur radio"



We still make'em. Ask for our catalog of the Old Timer's favorite, "**The Bug**."

Write for our free brochure and see the latest from **Vibroplex** at your favorite dealer.

P.O. Box 7230 476 Fore Street Portland, Maine 04112 (207) 775-7710

CIRCLE 61 ON READER SERVICE CARD

AGL® Electronics

We're AGL, North Texas' AUTHORIZED Dealer for more than 70 different product lines of Amateur Radio Equipment. Need antennas and towers? We got 'um—just call Bill (K5FUV) or Gordon (N5AU) for your special requirements. Mike (KG5F) can advise you on transceivers and accessories. Let Gary (KM5X) box it up and send it your way, while Bob (W5AH) stands ready to help with your service and warranty needs. We like to talk radio, DX, contests, or tell jokes...Gordon's busy learning some new Texas Tall Tales!

CUSHCRAFT

A3 3el triband beam	$174.00
A4 4el triband beam	$227.00
A743 7-10 mhz add-on kit.	$62.00
A744 7-10 mhz add-on kit.	$62.00
20-3CD 3el monobander	$172.00
20-4CD 4el monobander	$240.00
15-3CD 3el monobander	$96.00
15-4CD 4el monobander	$108.00
10-3CD 3el monobander	$76.00
10-4CD 4el monobander	$89.00
A32-19 19el 2m "Boomer"	$84.00
214B14 elem. SSB "Jr. Boomer"	$69.00
214 FB FM "Jr. Boomer" 2m	$69.00
ARX2B 2m "Ringo Ranger II"	$35.00
ARX450B 450 mhx "Rng. Rngr."	$35.00
A-147-20T 20el 2m.	$62.00

HY GAIN

V2S 2m gain vertical	$38.00
TH7DX 7 el tribander	$369.00
TH5MK2S 5el tribander	$312.00
TH3MK3S 3el tribander	$215.00
TH2MK3S 2el tribander	$135.00
TH3JRS 3el jr. tribander	$157.00
HQ-2S 2el quad	$265.00
402BAS 2el 40m	$195.00
205BAS 5el 20m	$295.00
204BAS 4el 20m	$226.00
203BAS 3el 20m	$132.00
155BAS 5el 15m	$176.00
153BAS 3el 15m	$74.00
105BAS 5el 10m	$115.00
103BAS 3el 10m	$55.00
DB1015AS 3el duobander	$150.00
64BS 4el 6m	$52.00
66BS 6el 6m	$99.00
18 HTS hy tower vertical	$339.00
18AVT/WBS 5 band vertical	$89.00
14AVQ 4 band vertical	$54.00
214 14el 2m	$32.00
28DQ 2 band dipole	$49.00
5BDQ 5 band dipole	$98.00
BN86 balun	$17.00

Note: Part numbers with S on the end denote stainless steel hardware. Some small quantities remain of older stock; call for prices.

KLM

KT34XA 32 ft. boom tribander	$449.00
KT34A 16 ft. boom tribander	$309.00
7.2-1 40m dipole	$155.00
7.2-2 40m 2el beam	$289.00
7.2-3 40m 3el beam	$439.00
7.2-4A 40m 4el beam	$599.00
5el 20m "Big Sticker" mono	$429.00
6el 20m "Big Sticker" mono	$610.00
6el 15m "Big Sticker" mono	$389.00
6el 10m "Big Sticker" mono	$225.00
144-148-13LB 2m "Long-Boomer"	$75.00
144-150-16C 2m circular.	$95.00
432-16LB 432mhz "Long-Boomer"	$59.00
420-470-18C 450mhz circular.	$57.00

KLM antennas may be shipped from California or Texas, Freight Collect. Most require truck shipment. Call for details.

HUSTLER

5BTV 5 band trap vertical $99.00

Mobile antenna resonators:

	std	super
10m.	$10.00	$15.00
15m.	$10.00	$15.00
20m.	$12.00	$18.00
40m.	$15.00	$21.00
75m.	$17.00	$32.00

BM-1 bumper mount	$16.95
MO-1 fender mount mast	$22.36
MO-2 bumper	$22.36
CGT-144 2m colinear w/mount	$46.70

SANTEC

October Special $285.00

ST-144μP

SANTEC Accessories In Stock

YAESU **FT-102**

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CALL!!

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Top of the Line

It's what the Competition is trying to Equal!

ICOM **IC-740**

The NEW ICOM Transceiver

AEA **CK2**

The Serial Number Memory Keyer

Other AEA Products Available

KWM-380

CALLING AND CAN'T GET THROUGH?

In their infinite wisdom, the phone people require that we have twice as many lines as people to answer them. Just be patient and try again later; we aren't going belly-up any time soon. Also, we can't keep someone down here to answer the phone at night or on weekends, and we're too busy to answer the WATS on Saturdays.

TEXAS FOLKS

Please note that we're open until noon on Saturdays just for you. Visitors are welcome, too. We're in Keystone Park Shopping Center, across from Texas Instruments. Look for us under our two towers.

TELREX ANTENNAS

WARNING: These antennas are not for the faint of heart. They are heavy. They are large. They are expensive. They also work. These antennas require truck delivery and come in large boxes.

	WT.	Area
10m523 5el 10m beam	64lb.	4.5
10m636 6el 10m beam	85lb.	6.0
15m532 5el 15m beam	95lb.	10.0
15m845 5el 15m beam	140lb.	14.0
20m436 4el 20m beam	108lb.	12.0
This is a custom antenna.		
20m536 5el 20m beam	113lb.	13.5
20m546 5el 20m beam	n/a	n/a
This is a custom antenna.		
20m646 6el 20m beam	176lb.	17.0
40m329 3el 40m beam	110lb.	12.6
40m346 3el 40m beam	177lb.	13.8
TB5EM 5el tribander beam	49lb.	7.0
TB6EM 6el tribander beam	85lb.	10.0

Call for pricing — F.O.B. Dallas.

ROHN TOWER

25G 10 ft. section.	$40.50
45G 10 ft. section.	$91.90
25AG4 top sec., req. bearing	$54.00
45AG4 top sec., req. bearing	$103.00
GA25G guy bracket with bars.	$22.00
GA45G guy bracket with bars.	$43.00
SB25G short base section	$19.00
SB45G short base section	$43.00
EP 2534-3 3 hole equalizer plate	$9.95

Self Supporting Towers

HBX56 56 ft. self support	$335.00
HDBX40 40 ft. self support	$249.00
HDBX48 48 ft. self support	$305.00

Our BX series towers include the base stubs. Beware those who charge extra for them. Also, freight collect from Dallas may save over freight pre-paid because of varying distances and routing. Drop ship or factory pick-up prices may be higher due to factory pricing policies. West Coast/Rocky Mountain prices may be 10% higher depending upon shipping point. Call for firm quote before ordering.

ROHN FOLD-OVER TOWERS

FK2548 48 ft. 25G foldover.	$699.00
FK2568 68 ft. 25G foldover.	$869.00
FK4544 44 ft. 45G foldover.	$981.00
FK4564 64 ft. 45G foldover.	$1170.00

Freight prepaid on foldover towers. Sales tax may be applicable in some areas. West Coast/Rocky Mountain prices 10% higher.

HY-GAIN CRANK-UP TOWER

HG-52 SS 52 ft. self support.	$874.00
HG-54-HD 54 foot self support	$1414.00
HG-70 HD 70 foot self support.	$2187.50

Above shipped from Lincoln, NE. Sales tax required in some areas, freight paid on shipments in 48 states. Call for details on these and other Hy-Gain items.

PHILYSTRAN GUY CABLE

This is RF transparent, sun resistant, guy cable. Avoid those hours of putting insulators into steel cable. Enjoy the advantages of freedom from unwanted resonances that can soak up your radiated RF energy.

HPTG 4000 4000 lb. test cable	$.44/ft.
HPTG 6700 6700 lb. test cable	$.60/ft.
9901LD potting head.	$4.99
9902LD potting head for 6700 lb.	$5.49
Socketfast potting compound	$9.00/pt.

TOWER HARDWARE

3/16" EHS steel guywire	$.12/ft.
1/4" EHS steel guywire	$.15/ft.
3/16" ccm cable clamp.	$.29 ea.
1/4" ccm cable clamp	$.39 ea.
3/8 x 6" TBE&E turnbuckle.	$5.39
1/4" th thimble	$.24 ea.
3/16" preformed guy grip	$1.75
GAS604 screw anchor	$12.00
GAR604 concrete guy anchor.	$12.00
M200H 2" x 10' steel mast	$37.00
500D guy insulator	$.85
502 large guy insulator	$1.80

Note: Some items too large for UPS shipment. Call before ordering to check shipment mode.

HY-GAIN PACKAGE #1

TH7DX.	7el Tribander
HG 52SS	Self Supporting Tower
Ham IV.	Rotor
COA	Coax Arms (3 Furnished)
HG-10	10 ft. steel mast
HG-TBT	Thrust Bearing

Your Price!!! $1,533.00

FREIGHT PRE-PAID!!!

May require 4 to 6 weeks delivery. Sales tax may be applicable in some states. Shipped from Lincoln, NE. Cashier's check or money order in advance required—no credit cards. Sorry, no substitutions on this package.

HY-GAIN PACKAGE #2

HG-52-SS	52 Ft. Crank-Up
HG-10	10 Ft. Mast
HG-TBT	Thrust Bearing
HG-COA	(3) Coax Arms
Ham IV.	Rotor

ALL FOR ONLY $1,190!!!

Shipped from Lincoln, NE. Allow 4 to 6 weeks for delivery.

ROTORS

Ham IV.	$192.00
T2X.	$247.00
HDR300 for LARGE arrays	$419.00
Alliance HD73.	$94.00

CABLE

Saxton RG213 50 ohm coax	$.31/ft.
RG 11/U 75 ohm coax	$.31/ft
LDF4-50 Andrews HELIAX®	$1.48/ft.
8 cond. rotor cable	$.18/ft.
8 condHD rotor cable (for 150+ft.)	$.36/ft.
Mini 8 52 ohm small coax	$.16/ft.

Heliax® cannot be shipped by UPS as it cannot be coiled tightly enough to conform to size restrictions without damage.

CONNECTORS

Amphenol PL259 (Silver Plated)	$1.25 ea
Amphenol 82-61 type n	$2.85 ea
Andrews L44U UHF female	$17.00 ea.
Andrews L44PUHF male.	$17.00 ea.

SPECIAL NOTICE

We will be CLOSED the 29th and 30th of OCTOBER for the CQ WWSSB CONTEST

Sorry, we can't accept personal checks for mail orders, and can't ship C.O.D.

Due to the Yen rate, manufacturer's whims, increasing costs, and the 90 day lead time, all prices are subject to change without notice or obligation: they may go up or they may come down.

Quantity discounts begin at 100 units, except for cable and tower hardware.

PLEASE NOTE:

All drop ship orders, Hy-Gain tower orders, and Rohn foldover towers require payment by cashier's check or money order in advance. We won't accept credit cards for those items only.

CALL TODAY 1-800-527-3418

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CIRCLE 39 ON READER SERVICE CARD

BAND-BY-BAND BREAKDOWN—TOP ALL BAND SCORES

Number groups indicate: QSO's/Zones/Countries on each band.

WORLD TOP SINGLE OPERATOR—ALL BAND

Station	160	80	40	20	15	10
9Y4VT	116/9/16	385/17/43	553/23/61	1220/29/66	874/27/68	1140/28/71
CT3BZ		385/17/44	643/18/52	1324/29/72	1279/25/68	1075/22/58
HK3A		328/14/40	320/18/51	938/24/68	925/25/57	1312/26/71
N6BT/AHØ	18/2/2	238/15/27	497/19/30	522/29/56	1587/28/60	1221/28/53
UF6CR	83/8/22	183/9/33	509/15/49	970/27/65	787/21/53	1130/20/65
8P6J	25/5/8	154/9/15	256/12/30	1457/26/57	1450/29/68	1323/26/63
K1GQ	8/7/8	208/18/61	425/24/76	576/32/85	438/31/80	473/26/80
K8LX	10/6/8	88/15/46	366/22/65	636/29/81	559/28/78	636/27/81
K1KI	17/7/11	119/17/58	311/17/67	604/32/96	464/31/84	529/28/85
EA2IA		582/15/51	659/19/58	368/25/70	591/25/66	878/26/73

USA TOP SINGLE OPERATOR—ALL BAND

Station	160	80	40	20	15	10
K1GQ	8/7/8	208/18/61	425/24/76	576/32/85	438/31/80	473/26/80
K8LX	10/6/8	88/15/46	366/22/65	636/29/81	559/28/78	636/27/81
K1KI	17/7/11	119/17/58	311/17/67	604/32/96	464/31/84	529/28/85
N5AU	15/10/11	97/15/33	386/27/68	511/33/82	538/31/73	542/26/82
K1AR	4/4/3	134/14/50	226/33/64	447/30/85	587/31/80	605/28/89
K2VV	9/3/5	109/12/38	365/19/63	584/28/83	531/29/76	481/27/77
W2REH	6/5/13	88/14/42	371/22/64	547/34/93	377/31/82	468/29/87
N2LT	3/2/1	129/12/40	434/20/66	490/28/69	445/31/69	634/25/78
W1KM	3/2/2	274/19/56	414/23/68	460/24/60	360/29/66	523/24/67
K9DX	13/7/6	89/12/41	315/22/66	464/30/78	523/30/78	509/25/79

WORLD TOP MULTI-OPERATOR SINGLE TRANSMITTER

P41E	16/7/14	375/16/40	534/23/63	1636/35/97	1010/36/91	1484/31/83
YU3EY	27/6/26	89/10/55	479/31/95	618/35/131	780/36/125	2058/32/113
YW5A	9/7/6	348/16/41	580/24/66	1083/29/88	888/29/69	981/29/69
R5I	65/10/32	653/19/62	626/24/75	684/34/86	1381/31/90	1001/35/96
N4AR	17/9/16	67/16/62	461/28/92	755/34/110	499/33/101	686/32/97
UK2PCR	104/8/34	266/18/60	439/25/86	1034/32/85	780/33/88	609/33/89

USA TOP MULTI-OPERATOR SINGLE TRANSMITTER

N4AR	17/9/16	67/16/62	461/28/92	755/34/110	499/33/101	686/32/97
N1AC	5/4/5	104/15/53	333/27/72	1008/35/95	622/32/77	638/27/86
W3BGN	14/9/12	111/17/61	390/25/74	566/35/100	441/35/94	793/31/100
K1XA	1/1/1	73/15/56	481/23/72	757/35/95	424/34/88	489/27/86
N4RJ	6/6/5	46/15/45	388/27/77	701/35/106	569/35/98	363/28/85
W4NL	13/11/12	70/16/57	283/24/71	785/35/106	502/31/91	357/27/79

WORLD TOP MULTI-OPERATOR MULTI-TRANSMITTER

W2PV	72/14/27	427/18/70	1101/30/103	1389/35/118	1228/35/103	1050/34/106
N2AA	49/12/15	461/21/70	803/26/85	1475/37/115	1314/35/113	1051/33/108
W3LPL	53/12/20	263/18/65	1012/29/106	1323/38/123	1179/35/111	875/33/110
OH3AA	250/9/36	596/17/56	941/24/81	1823/34/92	1632/31/86	1440/33/96
K2UA	41/11/17	380/18/65	1161/29/91	1051/36/119	1129/35/109	1006/33/106
N9MM	83/16/25	223/21/56	870/29/96	1253/39/115	1157/35/103	1072/33/100

USA TOP MULTI-OPERATOR MULTI-TRANSMITTER

W2PV	72/14/27	427/18/70	1101/30/103	1389/35/118	1228/35/103	1050/34/106
N2AA	49/12/15	461/21/70	803/26/85	1475/37/115	1314/35/113	1051/33/108
W3LPL	53/12/20	263/18/65	1012/29/106	1323/38/123	1179/35/111	875/33/110
K2UA	41/11/17	380/18/65	1161/29/91	1051/36/119	1129/35/109	1006/33/106
N9MM	83/16/25	223/21/56	870/29/96	1253/39/115	1157/35/103	1072/33/100
K1ZZ	50/13/18	353/20/67	909/28/89	1173/36/119	1049/34/97	1005/33/108

WØSR	"	79,170	267	29	76	
K4VX/Ø	**21**	**397,764**	**1068**	**34**	**93**	
WØKEA	"	306,125	864	34	91	
WAØMHJ	"	244,488	727	34	88	
NØBCN	"	116,202	377	30	77	
N9BD/Ø	"	33,900	161	22	53	
KØZX	**14**	**327,228**	**850**	**36**	**98**	
ACØS	"	121,680	404	27	77	
WØSA	"	60,426	253	27	54	
WØFO	"	12,212	96	12	31	
KFØA	"	4,309	48	12	19	
KØRF	**7**	**337,280**	**949**	**31**	**93**	
ABØI	"	**335,775**	**1080**	**26**	**85**	
						(Opr. KØXR)
KJØD	"	42,600	319	23	52	
WØJU	**3.5**	**10,836**	**95**	**15**	**28**	
WØRT	"	3,128	41	12	22	
WBØCMM	**1.8**	**3,276**	**65**	**13**	**15**	
KØZK	"	1,520	39	10	9	

ALASKA

AL7H	**A**	**2,078,352**	**2683**	**107**	**199**
KL7RA	"	**2,015,026**	**3340**	**85**	**162**
KL7Y	"	108,102	363	57	72
AL7X	**28**	**75,460**	**747**	**21**	**23**

BAHAMAS

K8CW/ C6A	**7**	**85,572**	**609**	**15**	**51**

BARBADOS

8P6J	**A**	**3,868,716**	**4665**	**107**	**241**	
						(Opr. N6TJ)

BRITISH VIRGIN ISLANDS

VP2VHX	**A**	**308,924**	**917**	**50**	**104**	
						(Opr. N6OM)

CANADA

VE1AIH	**A**	**774,080**	**922**	**86**	**242**
VE1ANU	"	462,735	603	85	230
VO1AW	"	172,142	423	53	113
VE1CAN	"	129,628	556	26	66
VE1TG	**21**	**89,440**	**465**	**24**	**56**
VE1BRB	**14**	**167,132**	**772**	**26**	**68**
VE1CEG	"	56,225	333	18	47
VO1QU	**7**	**14,112**	**124**	**13**	**35**
VE1BEC	1.8	472	65	2	2
VE2AYU	**A**	**935,688**	**1209**	**88**	**224**
VE2DPO	"	121,268	369	46	96
VE2AH	**14**	**138,753**	**644**	**22**	**59**
VE2WA	"	4,810	50	14	23
VO2CW	7	25,393	158	20	47
VE3IY	**A**	**2,607,795**	**2563**	**113**	**292**
VE3DZV	"	470,880	624	87	201
VE3HD	"	411,808	537	89	183
VE3GCO	"	393,476	596	78	178
VE3UOT	"	275,317	410	77	182
						(Opr. VE1BCZ)
VE3GCE	"	158,498	310	66	128
VE3NBW	"	27,010	135	29	45
VE3MKJ	"	17,160	155	20	32
VE3BMV	**21**	**653,856**	**1665**	**35**	**112**
VE3DUS	**14**	**73,206**	**334**	**25**	**58**
VE3KRN	**7**	**113,119**	**557**	**23**	**66**
VE3INQ	**1.8**	**10,944**	**238**	**11**	**13**
VE4AIV	**A**	**195,917**	**861**	**39**	**68**
VE4MF	"	69,550	186	45	85
VE6OU	**A**	**1,839,702**	**2302**	**110**	**217**
VE6COC	21	12,264	122	16	26
VE7BTV	**A**	**885,720**	**1687**	**82**	**138**
VE7QC	28	11,340	139	14	21
VE7DLM	**14**	**52,083**	**236**	**19**	**62**
VY1DD	21	960	28	9	11

DOMINICA

J73D	1.8	184	10	3	5

DOMINICAN REPUBLIC

HI8LC	**3.5**	**12,298**	**278**	**8**	**14**

HAITI

HH2VP	**A**	**1,666,224**	**2425**	**89**	**215**	
						(Opr. N4XR)

HONDURAS

HR1AT	**14**	**38,125**	**294**	**21**	**40**

JAMAICA

6Y5HN	**A**	**349,168**	**967**	**46**	**111**	

MEXICO

XE2MX	**A**	**715,009**	**1814**	**65**	**108**	

MONTSERRAT

VP2MEV	**A**	**1,138,671**	**2197**	**70**	**163**	
						(Opr. AJ6V)

PUERTO RICO

WP4BDS	**A**	**607,506**	**1915**	**49**	**97**
K6BR/ KP4	"	32,940	252	27	34
NP4DA	**21**	**57,816**	**321**	**21**	**45**

ST. LUCIA

J6LZA	**A**	**2,855,358**	**3463**	**109**	**254**	
						(Opr. WA6VEF)

ST. MAARTEN

P47A	**A**	**1,748,700**	**2831**	**79**	**182**	
						(Opr. KF1V)
W4UY/ PJ7	"	543,864	900	77	171	

U.S. VIRGIN ISLANDS

WB3JRU	A	3,348	38	14	22

AFRICA

BURUNDI

9U5WR	**A**	**230,724**	**764**	**34**	**68**	

CANARY ISLANDS

EA8ZZ	**A**	**94,815**	**247**	**44**	**85**
EA8VV	21	44,116	183	26	56
EA8ZS	**7**	**83,220**	**464**	**15**	**45**
EA8AK	**1.8**	**41,470**	**242**	**17**	**41**

CEUTA & MELILLA

EA9JV	**21**	**68,996**	**251**	**24**	**70**

DJIBOUTI

J28DM	**A**	**182,535**	**475**	**42**	**87**	

EGYPT

SU1AA	**A**	**2,382,114**	**2631**	**87**	**214**	
						(Opr. OH2MM)
SU1MI	"	1,518	66	8	15	

THE GAMBIA

C5AAU	A	1,376	19	15	17

KENYA

5Z4CS	**A**	**628,918**	**1033**	**66**	**140**	
						(Opr. JE1JKL)

MADEIRA ISLAND

CT3BZ	**A**	**5,701,590**	**4706**	**111**	**294**	
						(Opr. OH2BH)

MOROCCO

CN8CO	**A**	**493,318**	**992**	**51**	**116**	

REPUBLIC OF SOUTH AFRICA

ZS2RM	**A**	**250,475**	**406**	**75**	**140**	
ZS4SP	"	82,715	394	21	50	

REUNION ISLAND

FR8GGL	**A**	**1,092,564**	**1870**	**57**	**141**	

ZIMBABWE

Z23JO	**28**	**78,309**	**410**	**16**	**47**	

ASIA

INDIA

VU2JN	28	18,810	156	17	38	

ISRAEL

4X6FY	A	28,480	156	22	42	
4X4UH	**21**	**372,075**	**1102**	**33**	**90**	
4X4NJ	**1.8**	**18,252**	**178**	**10**	**29**	

JAPAN

JA1IDY	**A**	**1,299,960**	**1442**	**111**	**203**	
JE1HJJ/7	"	**1,209,117**	**1344**	**112**	**197**	
JE1CKA	"	**1,085,448**	**1270**	**111**	**183**	
JR1RNC	"	1,042,720	1282	98	182	
JH1EAQ	"	592,382	847	93	145	
JA1JKG	"	579,598	868	89	147	
JF1SEK	"	476,740	833	72	125	
JJ1SOE	"	467,124	803	84	117	
JH2CJW	"	434,727	640	94	149	
JA1NLX	"	426,870	787	73	113	
JF3CCN	"	418,446	759	73	116	
JA9CWJ	"	407,148	634	83	139	
JA7JWF	"	352,408	622	80	116	
JA4ESR	"	339,628	605	84	113	
JA8SW	"	334,396	694	61	103	
JA5SIX	"	315,840	532	76	134	
JM1RFT	"	298,566	602	71	100	
JR3XEX	"	290,080	553	74	111	
JA7JND	"	284,208	504	54	137	
JA1CMD	"	275,049	523	79	104	
JA1CJQ	"	234,557	494	67	96	
JA1JQY	"	215,445	571	71	88	
JA3HTT	"	214,675	489	69	86	
JH1MTR	"	194,480	400	74	96	
JI1PCN	"	163,520	404	61	79	
JA1QZC	"	152,210	343	57	98	
JA2DN	"	113,280	252	62	98	
JA1THL	"	89,252	297	44	62	
JA1SGU	"	82,052	196	65	81	
JK1FOC	"	76,336	260	40	64	
JE3MWB	"	74,481	232	44	67	
JH6TYD	"	71,060	259	40	55	
JA6ABG	"	58,855	165	54	69	
JA4YIH	"	57,474	213	41	52	
JH3ALU	"	56,320	155	49	79	
JL1DBI	"	49,164	175	47	55	
JA1KXT	"	40,110	136	48	57	
JA4AQR	"	36,828	194	26	40	
JA1BNW	"	34,776	190	24	39	
JA9YE	"	32,643	124	37	56	
JA5AF	"	25,839	111	36	51	
JF1EEK	"	22,572	108	33	43	
JA6AKV	"	22,401	133	18	39	
JH7RYQ	"	20,475	108	29	36	
JF1IMQ	"	19,008	125	27	27	
JA8CAQ	"	18,476	102	30	32	
JAØVUJ	"	13,923	91	24	27	
JK1HIX	"	12,152	86	24	25	
JAØGX	"	5,379	55	15	18	
JA9PBZ	"	3,760	62	14	14	
JH3CON	"	2,635	31	15	16	
JA3BCT	"	722	38	9	10	
JA7JT	"	486	9	9	9	
JE3MLS/1	"	216	6	6	6	
JA9BV	"	72	4	3	3	
JH1EDD	**28**	**462,070**	**1250**	**32**	**82**	
JG1NBD	**"**	**404,150**	**1176**	**33**	**85**	
JA8TRT	"	282,435	1028	30	65	
JH1RNZ	"	262,444	875	29	74	
JJ1NUB	"	237,402	823	24	70	
JA2HO	"	201,717	738	28	65	
JA1AFF	"	159,666	618	28	61	
JF2VDY	"	149,283	546	30	67	
JA7YRR	"	140,697	601	25	56	
JH1BNC	"	132,615	443	31	74	
JA3AA	"	118,350	455	27	63	
JA1DFQ	"	112,752	481	27	54	
JA3EQC	"	90,666	448	23	46	
JF1DSN	"	57,546	291	23	46	
JH7UJU	"	55,449	324	21	40	
JR3SPV	"	49,070	245	25	45	
JR7TJP	"	41,195	263	21	34	
JA7EC	"	36,920	248	19	33	
JA1OP	"	32,385	222	20	31	
JH1CNN	"	31,297	180	22	39	
JE2SOY	"	28,975	170	20	41	
JA7BVA	"	27,115	181	24	31	
JA1BFN	"	26,266	193	19	27	
JA3BRB	"	25,172	150	21	37	
JH6XLL	"	20,124	133	20	32	
JA4FM	"	15,660	106	21	33	
JA7ECT	"	12,920	113	18	22	
JJ1OSP	"	11,470	106	13	24	
JL1NRR	"	11,032	76	20	36	
JA1NTK	"	10,491	94	17	22	
JA1AAT	"	4,180	40	17	20	
JH7RZW	"	2,944	62	8	8	
JR7CDL	"	969	18	8	11	
JE2BNZ	**21**	**357,532**	**1073**	**36**	**77**	
JH2CXL	**"**	**321,399**	**900**	**34**	**89**	
JE1AYU	"	306,720	877	34	86	
JA5FDJ	"	283,404	855	35	76	
JR3GWH	"	271,254	873	35	71	
JF1EQA	"	204,474	663	32	74	
JF1PUW	"	196,704	692	31	65	
JF1EZH	"	108,404	451	30	52	
JR3WXA	"	102,240	435	27	53	
JA1AEW	"	77,088	313	31	57	
JA7BIJ	"	61,005	417	21	28	
JF3PLF	"	56,700	307	26	37	
JA4GSX	"	54,384	291	24	42	
JG2LGM	"	51,267	260	25	44	
JH4MTE	"	48,048	254	23	43	
JA1LWX	"	33,712	209	21	35	
JR4ISK	"	30,739	181	18	41	
JK1AJX	"	26,128	199	20	26	
JE7BIZ	"	14,362	116	19	24	
JR1CER	"	8,496	82	15	21	
JA2KPV	"	4,800	54	14	16	
JL1QGB	"	4,240	40	16	24	
JH7HJF	"	3,648	42	14	18	
JE1NRX	"	192	6	6	6	
JG1ZUY	**14**	**339,031**	**976**	**36**	**83**	
						(Opr. JG1ILF)
JA7FTR	**"**	**254,408**	**748**	**33**	**85**	
JA1BWA	"	226,284	714	31	78	
JA7GLB	"	185,924	605	32	74	
JA6YCU	"	59,136	277	28	49	
JA1JIO	"	57,694	225	29	62	
JAØSC	"	51,069	208	30	57	
JAØCGJ	"	32,757	186	22	39	
JH7BRG	"	25,259	128	21	46	
JA1UPO	"	12,444	89	21	30	
JJ1DBA	"	12,169	99	17	26	
JG1QGQ	"	11,684	93	21	25	
JA1BDI	"	3,740	31	19	25	
JM1ABX	"	3,509	44	14	15	
JR2AQP	"	2,325	27	14	17	
JA1OHP	"	1,375	19	13	11	
JA1AVI	"	1,224	24	9	8	
JE2OOQ	"	900	23	8	7	
JG1WRN	"	374	12	5	6	
JH1LSS	"	273	13	4	3	
JE3MCC	**7**	**240,700**	**833**	**30**	**70**	
JA2INO	"	150,696	670	26	52	
JA1RWI	"	142,042	620	25	54	
JR1PNX	"	102,676	470	26	50	
JG1CDM	"	28,261	173	22	37	
JF3ELY	"	16,162	126	16	28	
JA9SQO	"	7,194	78	16	17	
JH8JYV	"	6,293	71	15	16	
JE6PWW	"	6,262	73	14	17	
JAØNL	"	2,793	53	9	10	
JA1BOK	"	1,551	51	6	5	
JG1GWE	"	342	19	3	3	
JA6JPS	**3.5**	**63,018**	**296**	**23**	**58**	
JH3BGG	"	59,812	283	26	50	
JA2IVK	"	39,444	204	25	51	
JAØDXG	"	38,178	224	22	41	

JA8DNV	"	30,120	182	22	38
JA2INS	"	28,187	142	25	46
JH7LVK	"	23,540	165	21	34
JA2LA	"	10,023	89	14	25
JA6BIF	"	8,262	95	13	21
JA7GAX	"	3,330	65	10	8
JA5DQH	**1.8**	**4,293**	**62**	**11**	**16**
JA7NI	"	4,158	67	12	15
JR1AHH	"	1,008	23	8	10
JA9BOH	"	584	22	5	4

KUWAIT

9K2DX	**A**	**2,263,494**	**2453**	**92**	**235**
					(Opr. N6NI)

MALDIVE REPUBLIC

8Q7BP	**A**	**69,870**	**316**	**25**	**60**
					(Opr. C5ABH)

MONGOLIA

JT6@UB	**A**	**17,338**	**269**	**19**	**37**

OMAN

A4XJO	**A**	**875,368**	**1335**	**73**	**174**

QATAR

A71AE	**7**	**26,936**	**204**	**15**	**37**

SAUDI ARABIA

HZ1HZ	**A**	**923,616**	**1107**	**77**	**211**

SRI LANKA

4S7MX	**21**	**407,565**	**1279**	**35**	**100**

ASIATIC U.S.S.R.

ASIATIC RUSSIA

UV9AX	**A**	**2,299,443**	**2022**	**103**	**290**
UA9UAR	"	716,274	1283	69	165
UA@SE	"	**238,581**	**644**	**44**	**103**
UA@LAF	"	95,232	317	53	71
UA@LCZ	"	68,272	202	58	78
UA9UGA	"	65,058	517	17	25
UA9AFG	"	63,246	177	46	79
UA9NN	"	42,075	102	59	94
UA9ACU	"	20,280	123	18	42
UA9OCI	"	11,750	52	23	24
UA@ZDE	"	10,908	144	21	22
UA9PP	"	9,568	80	19	27
UA9CHV	"	2,552	39	11	19
UW@AF	**28**	**198,198**	**843**	**26**	**73**
UA9QBE	"	**141,480**	**524**	**29**	**79**
UA9QBT	"	136,148	520	27	74
UA9XS	"	106,128	243	24	75
UA@FAY	"	25,668	434	11	14
UA9QBE	"	25,200	150	13	28
UA@CCR	"	20,090	171	18	23
UA@SAU	**21**	**316,825**	**1094**	**29**	**86**
UA9CIQ	"	**245,000**	**904**	**30**	**70**
UA@SGJ	"	32,232	193	25	43
UA9ADQ	**14**	**447,874**	**1412**	**34**	**88**
UA9WDM	"	13,025	137	16	17
UA@SGL	**7**	**29,680**	**317**	**17**	**36**
UA@JAD	"	23,001	230	19	32
UA9TS	**3.5**	**122,567**	**622**	**17**	**56**
UA9AJO	"	58,023	371	16	47
UA9CBM	"	51,904	300	13	51
UA9OO	"	27,387	185	11	40
UW@LI	"	**14,070**	**190**	**15**	**27**
UA9SAX	**1.8**	**17,480**	**179**	**9**	**29**

AZERBAIJAN

UD6DKW	**A**	**151,632**	**473**	**34**	**83**
UD6DLL	28	44,622	256	23	51
UD6CN	7	14,308	102	15	34
UD6DMV	**3.5**	**45,720**	**391**	**9**	**36**

GEORGIA

UF6CR	**A**	**4,101,936**	**3634**	**102**	**286**
UF6FFX	**28**	**74,053**	**396**	**20**	**51**
UF6FER	"	38,610	278	19	35
UF6FBX	21	3,780	105	13	23
UF6FFF	**14**	**233,280**	**864**	**29**	**69**
UF6FFJ	"	60,818	450	17	30
UF6QAN	"	33,088	246	13	34
UF6FDR	**7**	**101,931**	**609**	**15**	**46**

KAZAKH

UL7CCI	**A**	**163,310**	**412**	**39**	**92**
UL7QF	**28**	**160,860**	**724**	**22**	**62**
UL7CBP	**14**	**78,888**	**376**	**21**	**55**
UL7GDH	"	42,581	305	17	32
UL7CAL	**7**	**105,436**	**471**	**24**	**62**
UL7JAW	"	101,166	540	19	59
UL7TBM	"	83,266	425	20	59
UL7ECH	**3.5**	**63,278**	**461**	**17**	**41**
UL7PBY	"	33,432	246	12	44
UL7CAD	**1.8**	**6,214**	**87**	**9**	**17**

KIRGHIZ

UM8MCY	**28**	**61,530**	**371**	**21**	**47**
UM8MBA	**7**	**44,370**	**310**	**13**	**45**
UM8PAC	**3.5**	**25,360**	**249**	**9**	**31**
UM8MAZ	**1.8**	**3,894**	**72**	**6**	**16**

TURKOMAN

UH8DC	**A**	**1,651,674**	**2129**	**78**	**204**
UH8HBR	"	47,616	282	19	45
UH8EAA	**7**	**231,595**	**977**	**25**	**66**

UZBEK

UI8BI	**A**	**1,225,430**	**1546**	**89**	**221**
UI8ADR	**28**	**90,744**	**474**	**21**	**55**

EUROPE

AALAND ISLANDS

OH@XX	**A**	**2,490,540**	**2547**	**115**	**297**

AUSTRIA

OE6KZ	**A**	**381,220**	**728**	**63**	**182**
OE3RE	"	321,353	790	57	154
OE1JJB	"	8,760	93	22	38
OE3GSA	**28**	**298,507**	**995**	**32**	**89**
OE1WO	21	615	18	6	9

AZORES ISLANDS

CT2CY	**14**	**168,345**	**840**	**25**	**62**

BELGIUM

ON4FD	**A**	**1,553,140**	**2293**	**86**	**230**
ON4XG	"	439,064	891	59	139
ON5JM	**7**	**202,730**	**1110**	**22**	**73**
ON5WL	**3.5**	**27,636**	**475**	**9**	**38**

BULGARIA

LZ2BR	**A**	**159,796**	**613**	**50**	**132**
LZ1NJ	"	109,005	376	45	84
LZ1GZ	"	41,310	277	26	59
LZ1RN	"	29,862	355	12	30
LZ1YE	**28**	**181,940**	**717**	**32**	**78**
LZ2TW	**14**	**70,012**	**355**	**30**	**62**
LZ1LW	"	65,807	461	22	57
LZ1GV	"	4,118	59	11	18
LZ2DX	**7**	**100,776**	**671**	**20**	**56**
LZ1WJ	"	37,572	404	15	47
LZ1DQ	"	19,350	246	11	39
LZ2PP	**3.5**	**101,964**	**870**	**21**	**87**
LZ2RF	**1.8**	**10,962**	**234**	**9**	**33**
LZ2CW	"	3,078	110	5	22

CORSICA

FC@FOO	**A**	**1,094,940**	**1693**	**81**	**235**
					(Opr. N6RA)

CZECHOSLOVAKIA

OK2BLG	**A**	**1,493,736**	**1530**	**115**	**321**
OK3OM	"	**1,231,460**	**1667**	**91**	**244**
OK2BHV	"	**1,045,044**	**1389**	**99**	**278**
OK1FCW	"	903,420	1474	74	178
OK1AVD	"	797,000	1512	86	239
OK1AD	"	636,744	1040	79	179
OK2TBC	"	605,745	947	90	225
OK3YX	"	563,654	839	92	234
OK1FCA	"	389,301	855	65	186
OK2OX	"	343,808	534	84	232
OK3PQ	"	335,175	804	55	150
OK2YN	"	278,600	603	57	142
OK1ZP	"	247,736	691	54	125
OK1KZ	"	215,055	612	50	127
OK1DVK	"	201,122	433	68	159
OK1AWF	"	196,206	567	48	111
OK3IF	"	179,136	448	54	138
OK3YCA	"	155,730	435	51	94
OK1AWC	"	143,075	551	34	79
OK3FON	"	141,888	330	58	134
OK3CEG	"	129,990	299	61	149
OK1MKU	"	124,998	361	44	122
OK3BA	"	112,144	384	46	117
OK3KYR	"	111,200	369	42	97
			(Opr. OK3DT)		
OK3CAQ	"	90,770	269	45	100
OK1AOR	"	74,930	241	50	77
OK1AYN	"	60,424	174	51	131
OK1DMM	"	49,692	211	39	84
OK1FAM	"	49,456	249	28	60
OK2PBG	"	48,392	214	28	64
OK1APJ	"	46,550	169	41	57
OK1OFA	"	43,056	222	49	43
OK3KAP	"	40,313	208	29	62
OK2DB	"	38,250	181	43	82
OK1MIN	"	31,595	126	37	53
OK1MWN	"	30,736	178	24	64
OK1DRY	"	28,800	166	33	95
OK1MZO	"	27,051	175	31	96
OK1AOU	"	22,050	131	29	34
OK1AVG	"	21,120	166	22	33
OK1JDJ	"	20,826	202	17	61
OK1DGN	"	16,947	131	19	44
OK2KHS	"	13,952	172	16	48
OK2SGW	"	12,546	115	16	25
OK3BRK	"	8,288	117	11	45
OK1DMS	"	7,239	103	16	54
OK1APS	"	6,156	66	18	39
OK2SWD	"	2,368	64	9	28
OK1AEH	"	648	23	8	16
OK1ORA	"	216	11	4	4
OK1DCU	**28**	**320,679**	**1257**	**30**	**77**
OK1ZL	"	**229,416**	**739**	**33**	**88**
OK2BJU	"	32,040	202	21	39
OK3IAG	"	26,568	147	32	49
OK3CFP	"	25,704	150	22	46
OK1AVI	"	19,551	142	20	37
OK1MSP	"	10,659	77	20	31
OK1JIM	"	5,617	51	18	23
OK1AYQ	"	2,567	55	9	8
OK3KSQ	"	609	30	9	12
OK3ZWX	"	180	12	6	9
OK1TN	**21**	**257,255**	**950**	**30**	**85**
OK3CDP	"	**171,348**	**556**	**34**	**97**
OK1MG	"	160,121	586	30	83
OK3KAG	"	150,282	654	25	74
OK2SAT	"	100,260	504	25	65
OK2BUW	"	98,200	418	28	78
OK1AES	"	83,265	373	27	63
OK1JVQ	"	65,110	347	22	63
OK3KEX	"	48,174	319	22	52
OK1DZD	"	8,700	139	13	16
OK3KGQ	"	1,178	22	6	13
OK1ASQ	"	1,037	23	8	9
OK3CLA	**14**	**80,256**	**602**	**20**	**56**
OK1FV	"	76,540	371	29	60
OK2BUJ	"	69,222	341	24	59
OK2BGR	"	48,818	312	23	54
OK1JPH	"	32,770	268	16	42
OK1DDW	"	22,491	266	11	38
OK1ZY	"	8,880	91	15	33
OK3CDN	"	6,806	116	9	32
OK1JZZ	"	5,543	87	10	13
OK1FRJ	"	3,220	52	11	12
OK2BFN	**7**	**167,295**	**891**	**21**	**74**
OK3CAU	"	4,950	23	9	10
OK1XG	"	1,488	30	8	16
OK2SPS	"	462	16	6	8
OK3CEI	**3.5**	**28,620**	**419**	**9**	**45**
OK1DKR	"	**22,740**	**300**	**9**	**51**
OK1DEC	"	16,422	277	8	43
OK1AXA	"	15,860	257	9	43
OK1DCN	"	11,454	210	9	37
OK2PCF	"	11,130	243	7	35
OK2BAJ	"	10,810	236	7	40
OK3RRF	"	9,282	323	6	28
OK1OPT	"	8,892	225	6	32
OK2HI	"	8,052	127	8	36
OK1MKI	"	6,981	94	7	32
OK3ZBU	"	6,000	91	7	33
OK3CNP	"	5,334	82	8	33
OK3CPW	"	4,469	90	7	39
OK2BWZ	"	3,267	118	4	29
OK3COK	"	2,331	55	3	27
OK1DLD	"	1,681	36	7	34
OK2PFX	"	1,000	40	4	21
OK2BNN	"	480	31	4	12
OK2BVZ	"	209	24	3	8
OK3KFF	**1.8**	**19,764**	**303**	**11**	**43**
			(Opr. OK3CQW)		
OK1DFF	"	**10,305**	**240**	**8**	**37**
OL4BBP	"	4,488	137	6	28
OK1PGF/P	"	4,214	82	8	35
OK1STU	"	4,165	124	6	29
OL6BAB/P	"	3,744	101	3	6
OK2BKR	"	3,597	106	6	27
OK1KPA	"	3,120	123	5	25
OK2BWM	"	2,673	82	7	26
OL2BCC	"	7,296	82	4	24
OK1MNW	"	2,054	81	4	22
OK1DIJ	"	1,247	37	5	24
OK1AIJ	"	1,071	55	4	17
OK1HBT	"	920	41	4	19
OL6BDK	"	855	58	4	15
OL6BCS/P	"	663	51	4	13
OL1BAO	"	532	30	4	15
OK2BQU	"	528	17	7	15
OK1KQD	"	80	10	2	6
OL2VAH	"	30	5	2	4
OL2VAG	"	16	4	1	3

DENMARK

OZ8AE	**A**	**324,480**	**647**	**80**	**180**
OZ7BW	"	**226,116**	**461**	**72**	**126**
OZ1EXZ	"	179,292	569	41	93
OZ3LP	"	176,850	479	52	98
OZ5MJ	"	127,281	368	62	141
OZ1W	"	79,121	389	51	127
OZ1NF	"	70,518	317	37	101
OZ4HW	"	63,535	307	36	95
OZ4RT	"	15,038	78	33	40
OZ2RH	"	6,864	78	16	17
OZ7XG	"	567	15	9	12
OZ7BG	**28**	**79,392**	**317**	**27**	**69**
OZ5KU	"	62,745	286	28	61
OZ6KS	"	27,324	232	16	28
OZ1DKG	"	22,730	238	15	25
OZ1BRV	"	4,294	82	9	10
OZ6EI	"	450	30	2	3
OZ1CAH	21	792	15	12	12
OZ7JZ	**14**	**190,064**	**762**	**30**	**82**
OZ5WQ	"	22,685	176	15	50
OZ8XO	"	207	9	5	4
OZ1DYU	**3.5**	**3,627**	**80**	**7**	**32**
OZ1LO	**1.8**	**14,448**	**319**	**6**	**37**

ENGLAND

G3FXB	**A**	**2,720,785**	**2522**	**110**	**291**
G3XTT	"	**1,430,220**	**1566**	**92**	**271**
G3ESF	"	398,772	855	64	164
G2AJB	"	54,436	225	41	83
G8DI	"	26,846	195	18	44
G6NK	"	14,840	220	16	37
G4GIR	**28**	**423,456**	**1232**	**33**	**99**
G4IQM	"	83,731	484	22	51
G5EBA	"	2,560	59	8	8
G3RAU	**21**	**167,386**	**683**	**28**	**74**
G3TVW	"	155,134	678	26	72
G3WKL	"	35,283	326	19	38
G4KPE	**7**	**127,170**	**726**	**24**	**66**
G3XKQ	"	85,840	515	17	63
G2FNK	"	9,856	144	10	34
G3VMK	**3.5**	**98,118**	**741**	**16**	**63**
G3XWZ/A	**1.8**	**4,512**	**132**	**7**	**25**

FAEROES ISLANDS

OY7ML	**A**	**40,743**	**234**	**33**	**48**
OY2J	**28**	**162,640**	**1216**	**26**	**69**

FINLAND

OH2PM	**A**	**1,312,856**	**1497**	**107**	**272**
OH6MM	"	**259,532**	**658**	**58**	**159**
OH2BPE	"	188,100	639	42	90
OH8LB	"	172,960	470	52	132
OH5UO	"	158,832	488	44	88
OH7NW	"	150,150	352	48	147
OH2ZAR	"	148,470	410	45	102
OH2JQ	"	142,968	319	60	162
OH2VZ	"	129,132	283	63	141
OH7XI	"	117,470	345	55	115
OH3BI	"	113,894	386	49	118
OH3TY	"	113,360	241	64	154
OH9TD	"	107,533	252	58	139
OH2DN	"	106,400	289	54	121
OH5MQ	"	97,350	436	39	111
OH5PT	"	90,280	488	70	115
OH1PY	"	58,562	248	37	52
OH1RZ	"	46,620	146	47	101
OH2BQG	"	27,671	181	20	47
OH5AD	"	16,560	140	18	22
OH1FM	"	13,321	75	35	42
OH3TH	"	8,540	45	33	37
OH3BQ	"	7,434	124	16	26
OH2BFS	"	3,991	105	17	40
OH3XZ	**28**	**546,360**	**1918**	**34**	**95**
OH6EI	"	133,282	568	28	75
OH6RC	"	103,680	397	28	80
OH2BAH	"	74,481	292	28	83
OH6DU	"	34,840	340	16	36
OH1CI	"	31,278	172	19	59
OH1KC	"	28,990	201	20	45
OH5SS	"	14,899	150	15	32
OH6ZH/1	"	12,483	87	20	37
OH5LD	"	9,381	70	18	41
OH7JT	**21**	**415,877**	**1469**	**32**	**89**
OH6AC	"	**410,488**	**1537**	**31**	**74**
				(Opr. OH6WZ)	
OH5OZ	"	145,962	591	31	75
OH1CH	"	96,336	701	20	52
OH3HS	"	83,804	432	24	58
OH3OQ	"	18,963	205	14	29
OH8TU	"	15,180	115	18	42
OH3BQ	"	11,610	148	15	28
OH2BUU	"	1,990	67	4	6
OH6GE	"	200	10	5	5
OH8SR	**14**	**672,600**	**2151**	**34**	**86**
OH2BCD	"	54,080	432	14	50
OH3RO	"	20,184	432	14	50
OH7QU	**7.0**	**24,915**	**282**	**14**	**41**
OH3GZ	"	2,585	95	10	25
OH2BCI	**3.5**	**77,569**	**758**	**18**	**58**
OH6GD	"	6,520	141	7	33
OH2BVI	"	4,235	104	7	28
OH6NG	**1.8**	**4,080**	**112**	**5**	**29**

FRANCE

F8WE	**A**	**685,260**	**1182**	**71**	**111**
F9BB	"	139,925	385	45	100
F3AT	"	43,036	198	39	67
F6CCI	"	32,424	161	32	52
F3BC	"	18,640	165	18	22
F6GCP	**28**	**99,873**	**540**	**25**	**56**
F6BYJ	**21**	**84,293**	**500**	**23**	**56**
F6DKV	"	58,565	549	14	49
F6EWB	"	43,659	313	21	42
F6CUC	"	19,398	163	16	37
F6EID	**14**	**70,799**	**372**	**23**	**60**
F6EPO	**3.5**	**13,196**	**184**	**7**	**35**
F8TQ	**1.8**	**2,592**	**110**	**4**	**20**

GERMANY (FRG)

DK8NG	**A**	**1,894,810**	**1797**	**118**	**327**
DJ6QT	"	**1,493,760**	**1326**	**114**	**366**
DJ2TI	"	629,440	973	88	232
DL6RAI	"	528,478	837	78	200
DL1JF	"	444,990	713	78	195
DL3LU	"	415,872	656	81	207
DL8YR	"	383,568	657	71	191
DL2HQ	"	360,885	669	69	174
DK8KC	"	256,058	517	68	138
DL9EY	"	168,511	429	51	130
DK1DB	"	144,870	401	49	116
DJ1YH	"	106,029	290	55	98
DK1YK	"	98,637	239	64	119
DK7QB	"	85,488	390	47	57
DL1RAO	"	76,230	315	33	72
DJ2UU	"	43,316	184	38	81
DJ5JH	"	35,061	152	30	63
DK5OS	"	33,192	172	29	43
DL1NE	"	15,616	118	21	43
DJ9IR	"	12,935	90	23	42
DF2IY	"	11,799	103	25	32
DK4HD	"	10,922	72	34	53
DL8NAS	"	9,636	90	21	23
DF8AN	"	1,968	48	11	30
DL1BU	**28**	**509,878**	**1836**	**30**	**88**
DJ5PA	"	388,626	1087	35	98
DJ2HH	"	255,744	800	31	80
DJ1BC	"	236,358	1086	23	58
DJ0YI	"	208,912	940	25	63
DL8PE	"	112,590	459	25	65
DH2FAW	"	73,650	419	22	53
DL1AM/A	"	34,680	214	21	47
DK3GI	**21**	**714,280**	**1929**	**37**	**103**
DJ9MH	"	262,276	899	32	87
DL1TH	"	45,952	323	19	45
DL3CW	"	20,522	131	17	45
DK3BU	"	4,806	98	7	11
DJ2BW	**3.5**	**130,974**	**849**	**19**	**64**
DK3QJ	"	19,110	281	10	39
DK8AX	"	3,472	73	7	21
DL7HU	**1.8**	**4,318**	**134**	**5**	**28**
DJ3XD	"	4,154	130	5	26
DJ6TK	"	1,608	70	4	20
DK1DU	"	348	29	3	9
DF7IU	"	247	21	2	11

GERMANY (GDR)

Y31XA	**A**	**617,016**	**1201**	**79**	**203**
Y33ZL	"	**417,120**	**920**	**71**	**166**
Y37UF	"	**374,166**	**889**	**65**	**181**
Y22HC	"	353,367	780	57	156
Y22TO	"	325,620	644	70	173
Y43XL	"	282,100	765	59	158
Y47YN	"	250,344	801	50	133
Y21XC	"	199,485	513	57	138
Y31SK	"	148,454	435	57	142
Y55TA	"	147,220	425	50	120
Y25TG	"	132,670	444	54	124
Y31XF	"	129,054	343	48	109
Y36UE	"	120,946	429	51	112
Y31ZE	"	120,435	262	71	114
Y44XF	"	114,920	365	50	119
Y58YF	"	83,106	329	47	115
Y36YM	"	77,112	253	51	102
Y24DF	"	74,504	355	33	101
Y71SH	"	71,643	312	42	101
Y71RH	"	69,412	318	41	107
Y48UJ	"	68,689	257	45	104
Y22JA	"	67,200	182	63	112
Y51XE	"	64,539	310	36	65
Y31TM	"	51,842	169	48	113
Y32ZF	"	51,456	304	23	44
Y22HF	"	50,960	220	36	94
Y22DK/A	"	45,885	188	52	63
Y37XJ	"	39,406	127	53	69
Y39YD	"	35,343	162	39	80
Y41YN	"	34,435	183	28	69
Y23GB	"	33,652	168	34	60
Y23HN	"	31,392	204	24	72
Y57ZL	"	26,522	162	31	58
Y23RJ	"	22,785	149	30	63
Y22JA	"	22,344	160	19	57
Y23BE	"	20,331	105	36	45
Y35UB	"	17,672	112	37	57
Y51VE	"	13,283	167	47	80
Y54TA	"	13,275	100	27	48
Y52XF	"	12,336	127	13	35
Y24ZH	"	9,204	64	26	33
Y23LM	"	7,742	60	26	23
Y23FA	"	7,632	62	19	34
Y23CM	"	7,398	65	18	36
Y25CL	"	6,240	65	18	34
Y59ZF	"	5,044	43	21	31
Y38ZB	"	4,876	58	18	35
Y21XB	"	3,842	49	13	21
Y24KA	"	3,627	69	9	22
Y52ZL	"	2,880	35	16	20
Y41YJ	"	2,442	32	16	21
Y31QC	"	2,360	33	16	24
Y35LM	**28**	**194,726**	**856**	**29**	**69**
Y56YF	"	**85,556**	**462**	**24**	**49**
Y34SE	"	69,290	320	26	56
Y26SO	"	58,638	269	26	61
Y37VJ	"	37,275	200	24	47
Y27GL	"	33,003	240	17	40
Y41SJ	"	12,800	141	17	23
Y21XO	"	11,524	148	13	30
Y21JH	"	11,362	92	18	28
Y41VL	"	4,556	70	13	21
Y37RL	"	3,088	65	7	9
Y54XA	"	2,555	29	15	20
Y21CF/A	"	1,856	22	11	21
Y37ZE	**21**	**52,002**	**280**	**24**	**57**
Y52YG	"	44,672	353	18	46
Y22UB	"	23,584	352	24	43
Y55XH	"	2,970	50	12	21
Y55ZF	"	855	32	7	12
Y23PE	**14**	**18,480**	**178**	**13**	**31**
Y38YE	"	15,351	183	12	39
Y21EA	"	12,642	127	11	38
Y22YE	"	2,046	38	10	23
Y56WM	"	121	11	4	7
Y22WK	**7**	**10,856**	**179**	**9**	**37**
Y26IL	"	5,494	87	9	32
Y26FL	"	4,320	95	9	27
Y53ZF	"	2,508	47	9	10

GIBRALTAR

ZB2EO	**28**	**119,100**	**788**	**20**	**55**

GREECE

SV@AU	21	5,890	106	5	23
SV@AA	**3.5**	**17,600**	**203**	**12**	**43**

HUNGARY

HA6NF/P	**A**	**956,376**	**1418**	**86**	**210**
HA7PL	"	**823,914**	**1387**	**71**	**202**
HA1ZG	"	425,595	1669	77	178
HA8DZ	"	322,245	693	65	152
HA1KVM	"	196,620	399	69	157
HA5BA	"	178,974	536	47	136
HA4XX	"	170,004	478	56	130
HA6NW	"	143,314	626	37	94
HA5JK	"	137,084	370	54	118
HA@DU	"	87,463	230	57	92
HA3HZ	"	60,804	321	28	80
HA@LG	"	55,476	283	47	87
HA4YG	"	2,825	37	15	20
HA9PB	"	1,722	34	12	30
HA4KYN	**21**	**127,800**	**664**	**27**	**63**
HA1XR	**14**	**183,770**	**1013**	**27**	**67**
HA8DU	"	81,477	384	29	70

The Multi-Single team of K8AQM. Front to back are AI8D, AC8W, K8DD, KC8KQ, and WA8ARS.

HA7MS/P	"	49,654	360	21	53	
HA8KQX	**7.0**	**89,770**	**549**	**23**	**71**	
HA8QZ	"	53,404	446	18	61	
HA5KDB	**3.5**	**94,944**	**933**	**14**	**55**	
			(Opr. HA7UX)			
HA6NL	"	48,132	638	12	51	
HA7VM	"	10,023	250	8	31	

ICELAND

TF3YH	**28**	**366,757**	**1722**	**23**	**74**	
TF3CW	**21**	**380,430**	**1911**	**25**	**65**	

IRELAND

EI1DH	**28**	**222,224**	**1209**	**24**	**62**	
EI7CC	"	35,235	379	13	32	

ITALY

I2UBI	**A**	**1,677,900**	**2143**	**94**	**246**	
I7PXV	"	350,556	712	76	186	
I1POY	**28**	**174,357**	**783**	**25**	**66**	
I0XXR	"	164,731	670	27	74	
I2WDB	21	33,614	282	16	33	
I1QJC	**14**	**48,321**	**418**	**15**	**48**	
I1XPQ	**7**	**17,499**	**186**	**13**	**44**	
I4IND	**3.5**	**172,782**	**1113**	**19**	**68**	

MALTA

9H1CH	**28**	**162,750**	**699**	**27**	**78**	

THE NETHERLANDS

PA0XPQ	**A**	**422,734**	**831**	**63**	**166**	
PA0ABM	"	292,992	560	61	163	
PA0UV	"	273,824	607	59	140	
PA0GT	"	217,892	390	71	173	
PA0TA	"	207,580	446	63	151	
PA0WRS	"	181,746	397	59	148	
PA0DIN	"	64,080	225	42	138	
PA3BDK	"	11,546	178	24	63	
PA3ASC	21	29,040	124	16	44	
PA0PHK	14	18,389	145	17	54	
PI1PT	7	15,950	118	16	39	

NORWAY

LA3WAA	**A**	**1,162,254**	**1844**	**80**	**211**	
LA6ZW	"	**1,070,136**	**1440**	**88**	**246**	
LA4YW	"	471,511	907	69	160	
LA4RQ	"	5,547	54	20	23	
LA6XI	"	1,682	36	11	18	
LA2DAA	**21**	**30,874**	**301**	**10**	**33**	
LA7SI	"	27,712	215	16	48	
LA6ZV	"	15,933	177	13	47	
LA4XX	"	5,547	55	16	27	
LA2KD	"	2,888	45	15	23	
LA7XB	**14**	**36,540**	**285**	**17**	**41**	
LA7VL	"	30,480	231	19	41	
LA5YJ	**3.5**	**67,270**	**702**	**16**	**46**	

POLAND

SP3HLM	**A**	**796,789**	**976**	**97**	**246**	
SQ5Z	"	**497,920**	**1217**	**67**	**189**	
			(Opr. SP5ANJ)			
SP8HRA/9	"	466,500	760	83	217	
SP3HC	"	199,199	577	53	146	
SP4JWD	"	166,911	497	52	125	
SP5BR	"	154,452	367	58	153	
SP5LM	"	134,640	378	55	149	
SP6AZT	"	133,781	309	60	117	
SP9BBH	"	119,040	405	41	119	
SP9AKD	"	99,693	285	57	114	
SP7AWA	"	89,355	299	49	112	
SP3IOE	"	73,753	281	43	88	
SP3EQE	"	48,510	241	32	78	
SP2HBP	"	31,488	176	24	58	
SP2AEK	"	25,935	162	29	62	
SP2BIK	"	19,106	149	20	62	
SP9EQS	"	16,786	130	26	51	
SP3CB	"	7,072	61	24	44	
SP1MVW	"	2,100	43	10	15	
SP9CTS	"	168	12	5	9	
SP5AD	**28**	**201,366**	**685**	**32**	**81**	
SP5ACN	"	104,244	325	33	86	
SP1KAA	"	20,776	163	17	32	
			(Opr. SP1ADM)			
SP5AFL	"	19,152	160	18	30	
SP9AAB	"	17,954	156	17	30	
SP4EDQ	"	17,520	94	22	51	
SP3BQC	"	7,105	76	13	22	
SP9ZD	"	6,279	62	15	24	
SP8EDP/4	"	1,144	17	11	15	
SP2BRZ	**21**	**187,000**	**637**	**33**	**92**	
SP4AWE	"	78,560	430	22	55	
SP5KVW	"	25,200	199	19	37	
			(Opr. SP-0102-05)			
SP6AYT	"	6,660	70	18	29	
SP2JKC	**14**	**154,770**	**694**	**30**	**80**	
SP2AVE	"	**117,688**	**652**	**25**	**69**	
SP6ATG	"	116,654	610	26	68	
SP6DMJ	"	44,643	353	7	69	
SP6UK	"	37,224	256	19	53	
SP6BVR	"	31,524	338	16	47	
SP2JGK	"	34,100	346	16	46	
SP5CJQ	"	26,334	251	12	45	
SP5MBA	"	25,380	243	13	47	
SP6BEN	"	25,288	248	14	44	
SP8MJ	"	21,970	153	19	46	
SP2EFU	"	21,358	204	16	43	
SP7JWZ	"	18,360	156	16	35	
SP2GOW	"	14,336	106	18	46	
SP7MGD	"	6,426	103	11	31	
SP6DMI	"	5,842	73	11	35	
SP9AIM	"	3,648	57	11	27	
SP2LLO	"	3,384	66	11	25	
SP3DOI	**7**	**68,614**	**312**	**26**	**65**	
SP5ARN	"	**66,502**	**417**	**17**	**65**	
SP4EEZ	"	55,204	428	16	58	
SP5JTR	"	40,257	319	15	56	
SP3DAH	"	30,120	294	14	46	
SP2HMT	"	24,704	231	16	48	
SP9EMI	"	22,428	175	16	47	
SP5IMK	"	952	24	6	11	
SP1EPP	**3.5**	**22,494**	**454**	**9**	**37**	
SP8EMO	"	16,800	285	7	43	
SP4BYQ	"	8,229	188	8	31	
SP6FER	"	7,749	115	8	25	
SP4AAZ	"	2,378	76	5	24	
SP9DH	**1.8**	**11,696**	**262**	**7**	**36**	
SP3GVX	"	4,719	146	5	28	
SP9UH	"	4,704	153	5	27	
SP1DPA	"	4,004	147	4	24	
SP6CZ	"	3,930	133	6	24	
SP8BVJ	"	1,650	66	4	21	
SP6LTF	"	1,600	87	4	16	

PORTUGAL

CT1AOZ	**7**	**141,860**	**868**	**19**	**63**	

ROMANIA

YO6VZ	**A**	**311,256**	**840**	**58**	**166**	
YO8FR	"	237,652	686	59	153	
YO3CR	"	128,117	301	64	145	
YO4PX	"	56,286	341	30	88	
YO7ARZ	"	39,904	148	41	75	
YO2BPM	"	36,714	257	14	59	
YO3RF	"	25,877	97	46	67	
YO2BEO	"	25,752	190	20	67	
YO7AWQ	"	21,945	176	27	68	
YO5BEU	"	7,920	154	13	35	
YO8BDQ	"	2,173	48	12	29	
YO1K	**28**	**333,200**	**1160**	**31**	**88**	
			(Opr. YO3JW)			
YO9HP	21	26,599	211	19	48	
YO7AQE	"	657	25	5	4	
YO4XF	**14**	**108,490**	**672**	**27**	**68**	
YO4PZ	"	25,758	288	15	38	
YO6UO	"	1,620	49	9	18	
YO3KSC	**7**	**117,045**	**706**	**18**	**67**	
YO4FM	"	12,100	178	10	34	
YO8BIG	"	11,180	136	9	34	
YO5BWI	"	774	44	5	13	
YO9HG	3.5	4,323	124	7	26	
YO4BUA	"	3,264	126	6	18	
YO3JG	"	2,673	64	6	27	
YO6BMC	"	2,222	100	5	17	
YO2BMP	"	1,088	68	3	14	
YO8BDV	"	820	40	5	15	
YO6BTY	"	432	41	3	9	

SARDINIA

IS0MVE	**28**	**34,404**	**311**	**18**	**43**	
IS0FPH	**14**	**118,233**	**806**	**22**	**65**	

SCOTLAND

GM3RAO	**A**	**310,116**	**800**	**42**	**130**	
GM4LGM	**3.5**	**21,630**	**363**	**9**	**33**	
GM4KWS	**1.8**	**6,876**	**170**	**8**	**28**	

SICILY

IT9MLK	A	15,520	115	25	55	

SPAIN

EA2IA	**A**	**3,057,204**	**3078**	**110**	**318**	
EA7XQ	"	648,516	1345	60	144	
EA7CAD	"	609,739	1213	66	155	
EA3ARO	"	251,870	663	49	129	
EA1JO	"	191,244	612	45	119	
EA5EV	"	124,020	448	44	112	
EA2CR	"	72,965	259	40	91	
EA3BOW	"	50,490	219	39	63	
EA3GF	"	9,600	86	23	27	
EA7OH	"	4,950	55	18	32	
EA3JC	"	2,340	78	19	40	
EA1AER	"	1,134	31	7	7	
ED7ATE	**28**	**57,850**	**490**	**12**	**38**	
EA5BAA	"	33,189	210	19	50	
EA5BRG	**21**	**60,254**	**279**	**26**	**68**	
EA5YU	"	38,232	247	18	51	
EC5ACS	"	28,090	246	16	37	
EA2ALW	"	15,052	200	10	18	
EA3CSX	"	6,900	101	10	20	
EC1AFN	"	3,276	86	8	13	
EA7ANJ	"	1,200	35	6	9	
EA3PE	**14**	**40,917**	**366**	**18**	**51**	
EA3AJO	"	20,650	214	11	39	
EA2OP	**7**	**105,588**	**573**	**21**	**63**	
EA1BAD	"	28,500	323	8	30	

SPITSBERGEN

SP2BHZ/JW	**A**	**267,375**	**819**	**51**	**104**	
JW5OD	"	**75,648**	**260**	**42**	**86**	
JW6MY	**14**	**12,525**	**184**	**10**	**15**	

SWEDEN

SM5AOE	**A**	**1,870,726**	**2266**	**94**	**247**	
SM0DJZ	"	**932,816**	**1242**	**97**	**249**	
SM5EQW	"	832,041	1415	74	207	
SM5CMP	"	414,414	812	72	159	
SM5DSF	"	281,316	586	60	144	
SM5CLE	"	232,070	492	70	160	
SM0BVQ	"	139,568	349	53	123	
SM5RE	"	77,945	383	38	81	
SM7LSU	"	76,440	268	47	83	
SM5ALJ	"	63,431	258	43	94	
SM6HCJ	"	33,677	150	38	81	
SM0CGO	"	17,487	105	30	37	
SM7CZC	"	16,974	101	34	48	
SM4AZD	"	14,350	90	32	50	
SM0XG	"	14,025	76	35	50	
SM5CBM	"	10,904	70	28	30	
SM6CPO	"	1,610	26	10	13	
SM0LTC	"	243	9	5	4	
SM4DHF	**28**	**205,920**	**730**	**30**	**80**	
SM6INC	"	**165,212**	**636**	**28**	**75**	
SM0BDS	"	157,384	610	29	74	
SM3DNI	"	121,364	599	26	61	
SM7BKH	"	119,310	469	26	71	
SM0TW	"	116,600	414	29	81	
SM5BRS	"	60,095	243	20	65	
SM1JBM	"	42,978	292	17	41	
SM0NBC	"	35,072	243	18	46	
SM0LH	"	13,320	141	13	32	
SM6DPF	"	10,707	101	14	29	
SM7WT	**21**	**36,366**	**201**	**24**	**42**	
SM7TV	"	14,812	150	14	32	
SM2JSN	"	7,968	98	10	22	
SM7KNW	"	950	14	12	13	
SM1DJI	"	186	11	2	4	
SM0AJU	**14**	**560,324**	**1751**	**34**	**93**	
SM2CEW	"	479,820	1444	35	97	
SM6JY	"	33,696	339	15	39	
SM3GJN	"	29,920	249	13	31	
SM6LAZ	"	20,550	230	14	36	
SM5UQ	"	16,556	213	11	32	
SM5AQJ	"	6,100	66	15	35	
SM5AD	**7**	**95,128**	**513**	**21**	**67**	
SM6BXD	"	17,930	134	14	41	
SM5IMO	"	6,549	99	12	25	
SM6JNT	"	3,780	89	6	24	
SM7HCW	"	3,630	54	9	24	
SM3CBR	"	392	20	4	3	
SM4CAN	**3.5**	**41,610**	**387**	**17**	**56**	

SWITZERLAND

HB9KC	**A**	**215,326**	**653**	**49**	**102**	
HB9QA	"	31,075	131	40	73	
HB9LF	"	30,590	322	34	67	
HB9BOW	"	9,635	87	16	25	
HB9AGH	"	8,183	66	18	31	
HB9AIJ	21	27,730	123	26	66	
HB9DX	"	18,690	81	28	77	
HB9BUT	**7**	**167,916**	**979**	**18**	**66**	

EUROPEAN U.S.S.R.

BYELO-RUSSIA

UC2AAX	**A**	**186,792**	**703**	**43**	**138**	
UC2WBJ	"	24,178	197	23	54	
UC2AFJ	"	7,452	149	13	23	
UC2WP	**28**	**11,050**	**150**	**10**	**24**	
UC2ACZ	"	4,725	55	12	23	
UC2AW	"	1,323	23	9	12	
UC2WAZ	**14**	**153,382**	**728**	**32**	**77**	
UC2ACA	**3.5**	**136,394**	**962**	**24**	**70**	

ESTONIA

UR2RHF	**A**	**390,250**	**913**	**66**	**184**	
UR2RKS	"	84,475	541	35	74	
UR2ZN	"	63,030	490	15	40	
UR2RSA	"	29,040	148	43	67	
UR2RCU	"	1,188	26	12	21	
UR2TAX	**28**	**230,736**	**736**	**32**	**100**	
UR2RMC	"	81,728	427	17	49	
UR2OI	"	59,850	387	20	55	
UR2RFL	"	132	6	5	6	
UR2RL	**14**	**170,040**	**917**	**22**	**56**	
UR2RWA	"	61,446	507	13	44	
UR2QD	"	84,530	794	17	62	

EUROPEAN S.S.R.

UA6HFO	**A**	**989,688**	**1805**	**75**	**199**	
UA3ABI	"	**400,140**	**999**	**67**	**161**	
UA3VDS	"	306,441	708	62	175	
UA6AJG	"	188,034	408	76	155	
UA3DBG	"	169,116	522	59	145	
UA3RDH	"	119,248	248	75	182	
UW3NE	"	117,691	325	49	112	
UA3AGF	"	106,740	297	56	124	
UA4CH	"	89,397	412	33	66	
UV3AP	"	45,666	204	39	90	
UA1DF	"	30,135	141	31	74	
UA3TAM	"	28,864	202	26	56	
UA6ALV	"	27,489	169	24	53	
UA3TAG	"	26,129	235	19	34	
UA3RCT	"	14,240	119	24	56	
UA6LFQ	"	13,430	140	22	57	
UA6LGM	"	12,250	165	19	31	
UA3ZGG	"	4,876	38	21	32	
UW6MA	"	288	16	4	12	
UA3DKU	**28**	**167,506**	**664**	**33**	**89**	
UA4LAW	"	41,688	404	19	53	
UA4AIS	"	28,090	259	14	39	
RA6AMH	"	270	8	7	8	
UW3UQ	**21**	**234,680**	**998**	**29**	**81**	
UA1QAU	"	125,550	628	30	60	
UA3EZ	"	115,425	597	27	68	
UW3HY	"	65,404	380	23	60	
UA3VAS	"	59,204	380	23	59	
UA4QA	"	54,075	362	22	53	
UA6AJO	"	50,112	380	18	54	
UW3WZ	"	30,608	199	19	45	
UA3YAO	"	9,495	110	14	31	
UA3UBN	**14**	**114,495**	**630**	**24**	**61**	
UA4HDZ	"	112,318	604	29	60	
UW6CV	"	72,474	373	27	64	
UA4PNL	"	65,619	446	21	48	
UA6AUT	"	52,839	391	19	38	
UA3DER	"	52,052	104	13	28	
UA1ZEC	"	14,722	201	15	19	
UA1DZ	**7**	**339,532**	**1387**	**29**	**87**	
UA6LLT	"	**145,845**	**769**	**27**	**78**	
UA6AAM	"	37,106	396	18	41	
UA4QM	"	5,418	69	14	29	
UW3HV	**3.5**	**58,156**	**606**	**15**	**52**	
UA3PAW	"	45,689	559	13	48	
UA3DFK	"	26,680	361	12	46	
UA1ZCR	"	8,955	147	11	34	
EZ6PAC	**1.8**	**918**	**51**	**6**	**11**	
UA3LBE	"	684	34	5	14	
EZ6ADW	"	570	30	5	10	
UA3JD	"	360	33	3	9	
EZ6ACB	"	70	10	3	4	

FRANZ JOSEF LAND

UK1PGO	**A**	**506,880**	**1152**	**64**	**128**	
UA1PAM	14	5,136	54	19	29	

KALININGRAD

UA2EC	**A**	**810,432**	**1203**	**90**	**246**	
UA2FCB	"	145,728	563	58	149	
UA2FCZ	21	5,688	68	12	24	
UA2FEW	**7**	**12,160**	**222**	**8**	**30**	

KARELIAN A.S.S.R.

UA1NAY	**A**	**192,639**	**556**	**47**	**110**	

LATVIA

UQ2GDQ	**A**	**1,688,036**	**2055**	**99**	**262**	
UQ2PM	"	140,728	439	56	150	
UQ2CR	"	96,547	397	42	89	
UQ2GKM	"	26,484	123	26	57	
UQ2GEC	"	7,599	103	19	32	
UQ2GDM	**28**	**336,736**	**1002**	**34**	**102**	
UQ2GIZ	"	172,356	623	30	76	
UQ2GCN	"	32,332	237	19	40	
UQ2GBJ	"	29,510	209	17	48	
UQ2OP	"	24,640	187	16	39	
UQ2GLS	"	9,030	123	10	20	
UQ2GA	**21**	**104,696**	**466**	**26**	**66**	
UQ2GDW	**14**	**321,720**	**1255**	**29**	**91**	
UQ2GFD	"	451	17	4	7	
UQ2GFN	**7**	**55,074**	**445**	**16**	**51**	
UQ2GCP	"	15,635	257	13	38	
UQ2AO	**3.5**	**16,100**	**272**	**8**	**42**	
UQ2GGE	"	13,795	221	8	40	
UQ2GEY	"	11,924	213	9	35	
UQ2PP	"	1,800	33	7	33	
UQ2GFU	**1.8**	**5,495**	**149**	**6**	**29**	

LITHUANIA

UP2NK	**A**	**2,231,411**	**2312**	**105**	**298**	
UP2BAS	"	**552,615**	**1211**	**67**	**218**	
UP2NA	"	465,290	891	62	176	
UP2OQ	"	289,674	632	56	153	
UP2BEG	"	230,016	525	50	142	
UP2PAQ	"	184,266	581	50	124	
UP2OU	"	172,312	425	56	125	
UP2DV	"	165,244	460	58	160	
UP2PCB	"	125,736	586	44	112	
UP2BDO	"	100,488	324	47	112	
UP2BAR	"	87,376	243	49	123	
UP2BBF	"	65,512	273	48	104	
UP2BBD	"	52,650	285	35	82	

UP2BDX	"	48,251	229	37	76
UP2BGW	"	39,474	287	22	80
UP2BIP	"	33,843	267	19	68
UP2PBM	"	26,691	226	25	68
UP2PCX	"	6,435	80	18	47
UP2AG	**21**	**36,984**	**253**	**21**	**48**
UP2AV	"	13,340	142	13	33
UP2BAO	**14**	**326,920**	**1777**	**24**	**64**
UP2BEI	"	161,280	712	30	75
UP2BB	"	43,080	403	15	45
UP2BJM	7	11,730	152	14	37
UP2BEZ	"	4,592	107	9	19
UP2CT	**3.5**	**34,314**	**492**	**11**	**46**
UP2BEW	"	20,538	413	8	34
UP2BIF	"	7,210	197	6	29
UP2BCX	"	1,197	55	4	17
UP2BAW	**1.8**	**16,785**	**354**	**9**	**36**
UP2BCG	"	5,735	180	6	25

MOLDAVIA

U050AL	**A**	**210,673**	**362**	**54**	**137**
U050DT	"	66,528	171	36	96
U050WC	28	30,736	216	20	48
U050BD	**14**	**93,292**	**722**	**22**	**61**
U05GR	3.5	4,134	68	7	32
U050DB	**1.8**	**4,131**	**141**	**6**	**21**
U05AP	"	325	22	4	9

UKRAINE

UB5LAW	**A**	**1,978,291**	**2010**	**112**	**315**
UB5EC	**"**	**1,690,812**	**2104**	**105**	**297**
UB5MBP	**"**	**1,322,010**	**1656**	**100**	**270**
UT5HP	"	813,054	1257	92	289
UB5MFT	"	493,450	967	74	219
UB5UKW	"	435,870	865	65	196
UB5ICS	"	430,660	721	81	224
UB5UKO	"	205,368	411	75	183
UB5MNR	"	181,390	622	49	145
UB5MEH	"	131,036	400	44	120
UY5TE	"	123,120	472	47	133
UB5MLP	"	96,117	308	45	116
UB5QCK	"	74,534	240	49	117
UB5VK	"	68,707	354	31	96
UB5TR	"	58,984	258	36	110
UB5MCV	"	50,850	340	21	69
UB5RCA	"	29,068	160	30	56
UB5FDG	"	21,528	133	24	54
UB5UWM	"	11,448	76	25	29
UB5DAV	"	11,194	163	20	38
UB5MMF	"	7,486	63	6	9
UB5ZBM	**28**	**52,954**	**272**	**27**	**56**
UB5RCH	"	20,295	199	13	32
UB5UKJ	"	10,336	112	10	28
UB5EKG	"	3,570	68	8	22
UB5UAU	"	2,760	54	8	22
UB5UWZ	"	1,785	35	9	12
RB5EGT	"	572	33	4	9
RB5IOV	"	6	1	1	1
UB5IIA	**21**	**208,488**	**865**	**30**	**89**
UB5WCW	"	161,332	689	29	77
UB5GBN	"	58,794	356	23	59
UB5SG	"	22,880	200	17	38
UB5UCJ	**14**	**216,783**	**881**	**34**	**77**
UB5LCK	**"**	**181,272**	**1069**	**25**	**58**
UB5ZEL	"	176,952	910	27	74
UB5CE	"	175,489	711	32	81
UB5MBN	"	71,337	469	21	52
UB5BZ	"	52,920	430	18	42
UB5KAF	"	48,300	397	20	40
UB5IAN	"	44,992	413	18	46
UB5WCV	"	16,695	206	14	39
UB5CEM	"	7,550	145	11	27
UT5HZ	"	1,932	84	10	13
UB5EEP	"	1,904	34	9	19
UB5JMR	**7**	**241,440**	**1192**	**31**	**89**
UB5UCR	"	55,476	362	18	49
UB5GAY	"	36,102	305	15	51
UB5FJ	"	20,511	190	13	40
UB5WCJ	"	15,808	152	12	40
UB5KAK	"	6,688	69	11	33
UB5KAU	"	3,075	104	9	16
UB5OCR	"	1,008	24	8	16
UB5NCV	**3.5**	**48,508**	**595**	**14**	**53**
UB5NQ	**"**	**44,086**	**562**	**12**	**55**
UB5HAF	"	23,608	382	11	41
UB5KBE	"	20,539	372	9	38
UB5UFJ	"	11,844	226	12	30
UB5UFO	"	8,619	105	7	32
UB5FDF	"	5,511	171	7	26
UB5VAW	"	5,130	99	7	31
UB5QEB	"	1,020	44	6	14
UB5ZAL	**1.8**	**10,260**	**203**	**10**	**35**
UB5WF	**"**	**9,320**	**215**	**8**	**32**
EZ5WAB	"	4,030	127	6	25
UB5MFY	"	3,025	100	6	19
UB5ECQ	"	1,168	61	5	14
UB5AAF	"	931	43	4	15

WALES

GW4BRS	**A**	**887,285**	**1587**	**72**	**179**
				(Opr. GW4DZE)	
GW3KYA	**21**	**84,656**	**532**	**21**	**53**
GW3MPB	**14**	**41,920**	**276**	**20**	**60**
GW3NYY	**1.8**	**21,320**	**341**	**11**	**41**

YUGOSLAVIA

4N1U	**A**	**2,458,920**	**2325**	**116**	**349**
				(Opr. YU1PKC)	
YU7AF	**"**	**613,326**	**1294**	**69**	**169**
YU1BM	"	420,716	800	72	197
YU7NGO	"	334,633	719	64	163
YU1NZW	"	131,217	367	52	139
YU7WW	"	89,324	282	52	111
YU2QU	"	1,920	138	35	81
YU1RA	"	224	8	8	8
YT3L	**28**	**484,120**	**1412**	**33**	**97**
				(Opr. YU3BC)	
YU3EW	**"**	**466,570**	**1336**	**35**	**95**
YU2SD	"	308,792	927	33	88
YU1EFG	"	284,400	856	33	80
YU2CTU	"	243,432	842	29	79
YU3CAB	"	240,468	792	31	85
YU7PWN	"	98,622	433	27	59
YU7BPQ	"	57,154	262	27	55
YU3ZV	**21**	**732,096**	**1957**	**37**	**107**
YU7OCV	**"**	**459,801**	**1301**	**36**	**105**
YU1DX	"	325,376	1189	33	91
YU2OG	"	304,420	1028	32	92
YU7PEF	**14**	**295,550**	**1196**	**32**	**83**
YU1KQ	"	129,160	666	23	38
YU5FKD	"	16,920	229	14	33
YU4AW	**7**	**287,538**	**1393**	**23**	**79**
YU4EGZ	"	115,056	633	24	78
YU2ACF	"	98,490	758	16	54
YU7AZ	"	26,733	275	14	43
YU3IXY	"	20,935	395	13	40
YU7QDT	"	15,963	150	13	38
YU2RA	**3.5**	**109,755**	**816**	**19**	**62**
YU4VBR	"	74,008	618	22	66
YZ9HDE	"	56,305	660	17	52
YU7SF	"	21,756	370	8	41
YU3USB	"	9,061	202	8	33
YU3TBG	**1.8**	**9,890**	**196**	**9**	**37**

OCEANIA

AUSTRALIA

VK2BQQ	**A**	**735,294**	**868**	**103**	**191**
VK2AYD	"	629,251	905	91	150
VK2APK	"	542,059	880	83	128
VK2GW	"	182,826	498	55	71
VK6FS	"	129,362	308	48	94
VK5KL	"	814	13	11	11
VK4LX	**28**	**407,868**	**1121**	**33**	**90**
VK4XA	"	264,880	1014	27	61
VK6AJ	"	169,446	621	28	65
VK5NVV	"	14,174	126	15	23
VK2DID	21	13,050	100	19	26

FRENCH POLYNESIA

FO8DF	**A**	**143,200**	**609**	**38**	**42**

GUAM

KG6DX	**14**	**525,420**	**1289**	**37**	**102**

HAWAII

KH6ND	**A**	**1,801,331**	**2206**	**109**	**168**
KH6IJ	"	4,875	43	20	19
KH6DX	**28**	**392,574**	**1452**	**34**	**57**
KH6JWK	**21**	**46,696**	**304**	**21**	**31**
KH6CC	**1.8**	**13,481**	**266**	**9**	**8**

INDONESIA

YB8AEG	**A**	**370,176**	**666**	**76**	**116**
YC8VM	**21**	**95,745**	**495**	**27**	**38**

MARIANA ISLANDS

N6BT/ AH8	**A**	**4,241,746**	**4083**	**121**	**228**

MARSHALL ISLANDS

KX6PI	**7**	**167,144**	**839**	**27**	**41**

NEW HEBRIDES

YJ8RW	**28**	**612,255**	**2138**	**31**	**66**
				(Opr. ZL1AMO)	

NEW ZEALAND

ZL1AIZ	7	19,133	125	20	33

OGASAWARA

JD1ABX	21	4,301	71	12	11

PAPUA-NEW GUINEA

P29NPL	28	6,680	114	11	9

PHILIPPINES

KP4KK/ DU2	**3.5**	**55,328**	**339**	**20**	**36**

SOUTH KIRIBATI

T44AA	A	6,228	115	10	8

SOUTH AMERICA

ANTARTICA

KC4USV	**21**	**290,829**	**1259**	**28**	**49**
				(Opr. N6WT)	
VP8ANT	**1.8**	**594**	**18**	**4**	**7**

ARGENTINA

LU1EWL	**A**	**411,768**	**839**	**58**	**110**
LU8DQ	**21**	**1,359,711**	**2993**	**37**	**116**

BRAZIL

PY2DLK	**A**	**649,440**	**1325**	**56**	**108**
PY7ZZ	**"**	**384,150**	**669**	**72**	**123**
PY2EXD	"	362,310	631	65	130
PY1BUY	"	121,720	480	32	53
PY2CAR	"	17,820	83	33	48
PY2FNB	"	9,434	60	20	33
PY3ZZ	"	3,358	32	19	27
PY1DFF	"	3,322	85	12	10
PY1BOA	**28**	**210,980**	**677**	**30**	**80**
PY1VOY	"	110,853	381	38	75
PY1IEG	"	4,128	58	9	15
PY2SHI	"	420	14	6	5
PY2BTR	**21**	**100,010**	**514**	**22**	**51**
PY2RAN	"	63,960	338	25	40

COLUMBIA

HK3A	**A**	**4,478,204**	**3823**	**107**	**287**
				(Opr. K3ZO)	
WD9IHD/ HK4	**14**	**253,878**	**841**	**28**	**74**

EASTER ISLAND

CE0AE	**28**	**100,359**	**540**	**23**	**40**

NETHERLAND ANTILLES

K3SA/PJ3	**A**	**1,091,555**	**1772**	**67**	**148**

PARAGUAY

ZP5XJA	**A**	**786,335**	**1424**	**59**	**128**

PERU

OA4AWD	**A**	**465,479**	**796**	**72**	**131**

TRINIDAD & TOBAGO

9Y4VT	**A**	**5,803,776**	**4288**	**133**	**325**
				(Opr. N6AA)	
9Y4VU	**28**	**443,504**	**1441**	**31**	**75**

URUGUAY

CX8DT	1.8	100	9	4	6

VENEZUELA

YV1NX	**A**	**1,368,920**	**1650**	**88**	**192**
YV3BQS	**28**	**199,080**	**870**	**22**	**57**
YV4BOU	**14**	**291,552**	**1020**	**25**	**71**
4M3AGT	**7**	**143,025**	**655**	**22**	**53**
YV4OY	**"**	**104,874**	**700**	**18**	**48**
YV3AZC	**3.5**	**58,555**	**415**	**15**	**34**
YV10B	**1.8**	**25,806**	**258**	**11**	**23**

MULTI-OPERATOR SINGLE TRANSMITTER NORTH AMERICA

UNITED STATES

N1AC	**4,149,032**	**2710**	**136**	**388**
K1XA	**3,444,246**	**2225**	**135**	**398**
N1TZ	3,158,025	2071	136	397
K1RU	3,001,200	2118	120	368
W1RM	2,855,776	1865	142	390
K1RQ	2,668,208	1773	137	387
K1XM	2,463,570	1819	123	342
K1EB	882,782	844	109	277
K1GSK	589,428	851	72	180
K1TN	417,248	364	114	302
W1BK	119,160	238	62	118
WB1CNM	112,896	504	67	157
K1GW	55,781	164	36	85
KQ2O	**1,622,000**	**1403**	**103**	**297**
N2GC	1,298,256	1112	110	298
K2BA	1,182,588	1204	100	241
W2RQ	1,161,888	1494	72	194
W2UI	649,788	669	99	247
K2TD	539,685	574	102	233
W2NC	459,340	477	101	239
KB2CR	10,106	64	20	42
W3BGN	**3,930,997**	**2305**	**152**	**441**
K3QMR	1,418,241	1345	111	252
K3ZUF	1,333,665	1130	117	288
AA3B	841,620	875	96	242
W3NZ	546,427	616	89	222
KB3MM	409,752	557	73	179
W3KFQ	350,841	530	82	167
N3GB	174,356	330	56	126
KA3GIK	51,847	134	57	82
N4AR	**4,564,350**	**2485**	**152**	**478**
N4RJ	**3,362,446**	**2073**	**146**	**416**
W4NL	3,253,040	2010	144	416
N4RV	2,364,483	1568	139	384
NQ4I	1,226,735	1228	98	251
N4KE	864,842	747	120	298
AA4KT	760,057	742	105	262
N4XM	389,620	567	69	184
K4EBY	170,940	360	54	111
KD4PP	75,660	188	48	108
W5RRR	**2,677,856**	**1742**	**149**	**387**
K5KG	1,985,311	1439	137	356

K5RX	1,614,944	1300	119	317
KJ5W	1,523,116	1407	115	294
N6ND	**2,414,346**	**1758**	**141**	**330**
N6IG	**2,369,760**	**1722**	**140**	**340**
N6CW	2,218,390	1624	141	344
NC6T	1,966,770	1644	121	289
K6XV	1,943,810	1477	136	315
N6MG	1,610,136	1236	138	318
W6OWQ	1,225,854	1146	112	266
N6DHV	1,061,788	1045	109	255
K6SG	1,015,668	1123	99	218
K6HIH	1,002,040	1073	110	218
K6DC	971,454	949	113	246
W6BIP	752,136	746	110	253
K6ANP	736,890	738	112	251
N6RZ	695,358	755	110	216
W6GO	670,941	633	123	258
W6UA	572,400	574	105	255
AF6S	519,370	556	114	220
KR6Q	434,775	661	85	170
KC6D	414,039	618	82	155
W6YX	395,136	616	91	133
W6BSY	253,228	383	82	154
K6FO	181,396	335	81	121
KB6ST	136,920	354	53	87

AA6T	122,430	290	60	94
KJ6F	73,962	200	44	82
KK6X	35,956	125	33	63
N6QC	594	19	6	5
W7RX	**1,331,700**	**1335**	**113**	**232**
W7NI	692,992	1012	84	180
AD8I	**3,225,735**	**2277**	**127**	**358**
K8AQM	2,189,064	1660	126	337
AD8O	1,309,950	1296	95	260
W8FN	542,724	694	81	192
K8US	207,776	489	47	104
WD8PNF	108,251	249	48	95
KA8HUZ	23,028	162	54	78
W8WE	19,754	129	37	46
KF8H	**1,683,968**	**1646**	**99**	**253**
KØRWL	1,436,292	1279	112	291
K7CS/Ø	501,084	629	90	189
WØNA	406,350	545	84	174
WØFF	217,170	381	62	128
KBØFP	64,964	162	47	102

ALASKA

WL7E	**889,344**	**1980**	**72**	**120**
KL7AF	846,745	1988	83	102

BAHAMAS

W4BPD/C6A	115,908	723	35	43

BELIZE

V3MS	3,307,920	4145	108	250

CANADA

VE1DXA	3,357,354	3174	117	312
VE7WJ	2,920,776	3103	125	268
VE5DX	2,777,273	3064	124	267
VE3MFA	935,881	1356	84	199
VE3OCU	44,055	230	38	51

JAMAICA

6Y5JW	774,408	2259	63	101

MEXICO

XE2BC	3,460,606	4324	109	229
4A2Q	1,207,038	2687	78	125

ASIA

ASIATIC RUSSIA

UK9AAN	4,300,833	2756	147	390
UK9FER	3,355,520	2795	109	319
UK9ADY	2,072,673	1979	97	272
UK9OAZ	1,931,778	1299	87	234
UK8OAA	1,922,050	2318	106	219
UK9ACP	1,115,909	1507	67	196
UK9AEC	335,491	629	55	142
UK9SBI	224,740	488	51	119
UK9OBO	64,620	289	27	73
UK9WAT	14,212	150	11	23
UK9ADS	8,181	107	10	17

GEORGIA

UK6FAA	28,440	240	12	33
UK6FAB	10,047	48	15	22

JAPAN

JA1YAB	**2,353,582**	**1908**	**142**	**292**
JAØYAK	448,500	649	96	154
JA1YCL	260,984	586	61	91
JA3YEE	234,016	401	77	129

EUROPE

AALAND ISLANDS

OHØAL	**925,750**	**1500**	**97**	**253**

AUSTRIA

OE1JNB	**1,109,652**	**1482**	**97**	**259**

BULGARIA

LZ2KEF	**2,142,584**	**2110**	**119**	**327**
LZ13C	549,336	1250	85	237
LZ2KSQ	522,332	1031	77	191
LZ1KKA	116,820	470	43	122
LZ2KLR	29,002	269	11	25

CZECHOSLOVAKIA

OK1KRG	**3,493,732**	**2780**	**129**	**413**
OK1KSO	**2,839,275**	**2423**	**135**	**350**
OK1KQJ	937,056	1239	97	247
OK3KEE	766,480	1291	83	203
OK2KPS	677,564	905	79	235
OK3RKA	466,444	822	74	194
OK3RJB	328,659	797	85	128
OK3KTD	164,430	506	56	133
OK2KYC	157,028	600	41	107
OK3KKQ/P	150,200	486	45	155
OK1OXP	91,749	497	29	90
OK1KTW	71,400	350	33	52
OK1KZW	64,284	293	31	101
OK1KPZ	35,844	177	34	69
OK1KUA	35,245	274	25	70
OK1KMP	17,712	145	22	60
OK1KOK	11,270	112	31	51
OK2KOD	9,170	109	21	49
OK1KYS	8,968	50	34	42
OK3KFO	4,044	122	5	7

DENMARK

OZ5EDR	**657,621**	**1188**	**77**	**190**

ENGLAND

GB2MM	**2,683,296**	**2792**	**100**	**296**
G6UW	**2,589,348**	**2526**	**115**	**338**
G3SSO	2,449,386	2615	103	299
G8JC	243,032	1555	68	185

FINLAND

OH2AA	**3,746,234**	**2580**	**143**	**444**
OH8AV	**2,465,964**	**2813**	**105**	**282**
OH2VY	2,059,600	2164	106	294
OH7AB	1,961,090	2526	94	241
OH5BM	1,529,580	1649	110	280
OH9PH	548,500	1233	70	180
OH3AC	16,368	166	18	48

FRANCE

F3TV	**3,959,040**	**3480**	**124**	**356**
F6KAW	**2,534,301**	**3877**	**99**	**272**

GERMANY (FRG)

DKØTU	**3,537,681**	**3116**	**116**	**355**
DL8CM	**1,732,710**	**1863**	**102**	**268**
DLØJR	1,109,934	1330	106	277
DKØSU	816,240	1321	79	196

GERMANY (GDR)

Y23DL	**1,353,994**	**1747**	**97**	**250**
Y59ZA	358,683	867	71	150
Y43ZK	318,599	907	59	140
Y32ZN	245,640	762	52	132
Y41ZA	128,480	373	52	108
Y41ZF	44,820	203	35	48

GUERNSEY

GU3SXW	**2,486,380**	**3130**	**95**	**270**
GU3HFN	**2,100,897**	**2658**	**86**	**247**

HUNGARY

HG5A	**3,664,364**	**3383**	**125**	**359**
HG6V	**3,625,734**	**3293**	**124**	**395**
HAØKLE	1,346,926	1921	88	234
HG8U	1,182,000	1519	111	283
HA5KKC/7	874,240	1719	77	179
HA2KRZ	843,700	1526	77	198
HAØKHW	637,864	1065	78	206
HA3KNA	491,547	983	78	185
HA6KOA	447,532	1168	65	147
HA8KAX	417,456	1005	61	162
HA7KLG	396,975	746	73	164
HA8KVK	337,176	746	66	153
HA9KOL	221,751	661	58	133
HA5KMB	173,415	554	48	117
HA7KTM	121,212	501	43	105
HA5KHT	67,235	335	37	82

ITALY

I2UIY	**255,208**	**814**	**48**	**104**

LIECHTENSTEIN

HBØAYZ	**292,656**	**658**	**60**	**141**

THE NETHERLANDS

PA6GN	**1,016,495**	**1725**	**74**	**189**

NORWAY

LA1H	**2,776,480**	**2347**	**125**	**344**

POLAND

SP2ZFJ	**1,030,760**	**1525**	**96**	**257**
SP6PAZ	580,800	1027	90	174
SP5KTR	357,532	833	72	154
SP9PDG	83,768	327	35	113

ROMANIA

YO8KGA	**224,224**	**607**	**54**	**154**
YO8KGH	3,815	132	9	31

SPAIN

EA3CNY	**1,525,828**	**2005**	**92**	**257**
EA3MM	875,597	1435	69	277
EA3RCR	778,752	1681	70	186

SWEDEN

SM5GMG	**4,053,616**	**3448**	**124**	**352**
SK5AA	1,278,930	1940	82	185
SKØLM	1,037,295	1466	84	231
SM2JUR	337,155	1310	36	69

SWITZERLAND

HB9AJ	99,941	403	43	96
HE9OZH	1,947	59	5	6

WALES

GW3RRS	**3,293,346**	**3380**	**105**	**294**

YUGOSLAVIA

YU3EY	**7,674,190**	**4051**	**150**	**545**
YU4EXA	428,708	1037	64	180

EUROPEAN U.S.S.R.

BYELO-RUSSIA

UK2AAX	**339,456**	**1115**	**52**	**140**
UK2ABM	149,645	499	46	127
UK2AAP	47,047	377	28	49
UK2AAQ	4,829	156	7	24
UK2ABC	1,275	24	9	16

ESTONIA

UK2RDX	**3,595,218**	**2999**	**133**	**384**

EUROPEAN S.S.R.

UK4FAV	**2,866,688**	**2698**	**133**	**376**
UK6LAZ	**2,320,539**	**2286**	**137**	**370**
UK6LEZ	2,176,842	2212	125	346
UK6LAA	1,971,288	2515	102	291
UK3XAB	1,439,887	2046	88	265
UK4PNZ	1,408,064	1568	111	338
UK6LTA	1,234,080	1737	96	264
UK4WAB	931,296	1363	96	260
UK4WAA	833,054	1444	74	197
UK4LAZ	597,536	1079	79	205
UK6PAA	526,516	1260	61	175
UK4ABW	440,370	875	53	180
UK1TBB	320,190	803	51	144
UK6APP	234,000	822	45	135
UK3DBV	122,320	431	22	66
UK4ACE	109,532	474	37	102
UK3ACM	94,550	667	22	39
UK3APV	47,110	487	19	30
UK6QAA	29,040	192	16	39
UK3TBF	17,415	155	21	22
UK6AJN	2,914	24	23	24
UK6ARA	1,792	57	11	27

LATVIA

UK2GKW	**2,141,457**	**2278**	**126**	**269**
UK2GDZ	1,570,894	1756	131	272
UK2GKO	1,094,554	1656	106	192
UK2GJL	558,296	1062	77	212

LITHUANIA

UK2PCR	**4,512,285**	**3184**	**149**	**442**
UK2PAP	**3,772,561**	**3028**	**135**	**386**
UK2BBB	**3,689,604**	**2950**	**135**	**403**
UK2PRC	2,157,969	2169	118	350
UK2PAO	1,225,851	1646	91	272
UK2BAG	1,173,550	1554	90	260
UK2PBR	804,000	1271	70	198
UK2PAT	614,304	1114	79	209
UK2BCO	445,050	1060	59	156
UK2BCM	349,209	849	55	152
UK2BBX	323,640	927	50	130
UK2BBF	301,392	892	49	158
UK2PAM	253,216	712	49	144
UK2BCC	227,855	700	63	136
UK2BAP	86,184	583	33	75
UK2BBQ	83,746	501	23	79

UKRAINE

R5I	**4,892,184**	**4209**	**153**	**441**
UK5MAF	**2,294,604**	**2268**	**120**	**348**
UK5YAA	1,882,285	1994	118	367
UK5UDX	1,115,840	1688	89	255
UK5QBE	939,455	1388	94	247
UK5MCO	936,000	1423	90	235
UK5AAZ	379,610	901	87	151
UK5MCP	361,000	818	69	181
UK5MEG	354,915	756	71	168
UK5NAJ	312,246	1071	50	148
UK5GKW	226,032	531	63	141
UK5FAB	190,736	694	50	132
UK5HAB	185,322	495	56	145
UK5MDI	140,876	514	48	116
UK5MCT	121,836	613	36	96
UK5QCI	70,794	432	36	102
UK5ECT	21,312	187	18	54
UK5IGL	14,872	166	14	30

OCEANIA

HAWAII

AH6BK	**2,167,170**	**2934**	**104**	**161**

SOUTH AMERICA

COLUMBIA

HK4RCA	**370,216**	**815**	**59**	**95**

CURACAO

P41E	**8,059,296**	**5055**	**148**	**388**

TRINIDAD & TOBAGO

9Y4KG	**1,774,152**	**2445**	**75**	**171**

VENEZUELA

YW5A	**5,481,975**	**3889**	**135**	**340**

MULTI-OPERATOR MULTI-TRANSMITTER NORTH AMERICA

UNITED STATES

W2PV	**10,431,729**	**5267**	**166**	**527**
N2AA	**10,147,820**	**5153**	**164**	**506**
W3LPL	**9,628,026**	**4704**	**164**	**535**
K2UA	**9,210,792**	**4768**	**162**	**507**
N9MM	**8,884,400**	**4658**	**173**	**495**
K1ZZ	**8,758,260**	**4539**	**164**	**498**
K9GL	8,411,580	4372	169	497
K1OX	7,750,722	4201	155	488
W3GM	5,600,364	3132	159	450
N6RO	**5,194,980**	**3147**	**160**	**429**
W6XX	4,499,040	2982	161	385
AI6V	4,280,400	2974	150	372
W1YN	4,142,319	2950	128	361
KN6M	4,126,788	2760	157	385
WØAIH	**3,993,852**	**2923**	**140**	**342**
N5RM	**3,623,614**	**2457**	**147**	**379**
N2RM	3,304,182	2499	116	337
K6XO	2,901,104	2085	148	348
K2TR	2,464,768	1758	126	338
W3NX	1,775,136	1394	128	323
K6ZM	1,327,002	1136	118	284
KD6NH	699,138	771	105	216
N3RW	247,312	379	67	141

ASIA

JAPAN

JA3YKC	**5,227,760**	**3590**	**153**	**352**
JA3YBF	**4,779,522**	**3459**	**146**	**332**
JA2YKA	**4,394,170**	**3224**	**143**	**330**
JA7YAA	3,251,033	2845	130	267
JA9YBA	2,847,148	2173	144	308
JA2YEF	2,523,864	2430	130	232
JA1YPF	2,257,134	2147	123	240
JA4YEB	1,457,184	1575	118	226
JA1YHA	1,082,120	1419	115	145
JA1YXP	976,976	1421	98	146
JH1YDT	696,960	1121	85	135
JA1YAG	288,864	571	71	106
JA6YDH	136,155	326	59	86

SAUDI ARABIA

HZ1AB	**464,136**	**705**	**68**	**165**

EUROPE

CZECHOSLOVAKIA

OK1KPU	**2,523,675**	**2451**	**105**	**332**

FINLAND

OH3AA	**9,301,635**	**6682**	**148**	**447**
OH1AA	**8,401,379**	**6230**	**150**	**451**
OH2AW	6,882,573	5276	151	428

GERMANY (FRG)

DLØKF	**4,825,688**	**4679**	**119**	**357**

THE NETHERLANDS

PA6WW	**4,312,440**	**4612**	**121**	**363**

NORWAY

LA4O	**1,528,534**	**2230**	**110**	**220**

U.S.S.R. EUROPEAN

ESTONIA

U2R	**5,656,896**	**5599**	**123**	**360**

YUGOSLAVIA

YTØR	**8,604,960**	**6560**	**152**	**472**
YU3APR	**8,450,047**	**5971**	**152**	**455**

OCEANIA

FRENCH POLYNESIA

FOØKP	**3,335,820**	**4256**	**103**	**162**

NIUE

ZK2RU	**5,191,542**	**4646**	**123**	**256**

QRPp

AC2U	A	591,856	728	84	200
N3RS	"	577,205	622	93	242
UP2BFC	"	441,881	753	81	208
OK2PDL	"	321,984	773	62	146
K4LTA	"	281,082	441	77	160
N4BP	"	268,832	410	74	174
AJ7S	"	267,544	452	81	131
VE3KZ	"	261,632	450	70	154
HP1XAT	"	253,215	699	57	96
DF4RD	"	220,712	566	52	136
W8VSK	"	216,104	329	73	165
WA6POC	"	186,200	383	62	113
SMØBYD	"	185,656	475	49	135
WAØVBW	"	183,080	338	67	132
W9PNE	"	179,861	335	64	133
N5BA	"	167,205	289	69	144
JA1KFX	"	106,470	284	53	77
HA5KD	"	97,838	333	43	99
KM8X	"	91,665	246	46	89
KA1CZF	"	54,929	166	47	86
YO5AVN/3	"	51,000	234	37	99
KA6LKO	"	41,633	185	28	51
SP5ANX	"	41,364	293	26	82
AA8S	"	35,114	142	37	60
K8IF	"	31,784	100	43	73
SM6LRR	"	30,392	239	19	39
OH6QU	"	28,424	201	23	65
K9PNG	"	27,918	110	31	63
DL4AAE	"	27,880	192	21	47
KA2CGV	"	27,456	101	45	59
SM7KNM	"	25,714	168	23	63
F9YZ	"	24,111	179	22	25
AC4X	"	21,320	78	28	54
SM5AFE	"	15,366	114	25	53
WD9EGW	"	14,399	75	34	43
OK1KRQ	"	13,365	119	20	61
WA2JOC	"	13,248	67	25	44
W8EAQ	"	12,064	95	25	33
UC2WBT	"	11,248	164	13	43
WØRSP	"	10,561	62	20	39
OK2BMA	"	10,250	84	19	31
YO7BKT	"	8,844	118	23	43
DF2MF	"	8,448	90	17	27
JA4JKD	"	8,140	67	21	23
N8CQA	"	7,344	60	20	31
EA8EY	"	7,331	64	15	24
WA3FNK	"	5,106	38	17	29
KI9A	"	4,848	46	21	27
YO3CVG	"	1,215	27	10	17
W2JEK	"	450	14	7	11
OK5RY	"	408	18	5	3
SMØCHA	"	192	16	3	4
JA1EF	28	92,583	404	25	56
JA1MCU	"	81,700	370	25	51
KBØHA	"	54,201	214	24	65
YU1NR	"	45,492	261	23	45
UA9FKM	"	37,185	217	15	42
JH1ARC	"	7,644	69	14	25
OK1DKW	"	5,952	87	13	19
UB5UGO	"	4,212	68	10	17
OZ8E	"	1,738	35	8	14
SP2UU	"	1,666	41	8	6
Y22ZL	"	1,584	40	10	12
UB5RBT	"	738	23	5	13
PAØATG	"	627	23	5	6
W9KNI	21	134,992	398	31	87
OH5WH	"	90,727	449	27	64
IØSKK	"	88,150	488	25	57
UT5GP	"	64,672	368	23	63
UR2CR	"	48,650	306	21	49
JA6VZB	"	45,525	210	25	50
JM1UHW	"	30,250	191	20	35
JA1TLK	"	21,634	127	19	39
Y22PM	"	21,528	233	15	36
OH1CN	"	16,520	202	15	25
OH7YG	"	15,228	117	18	36
PAØANK	"	10,608	151	11	23
G3CWL	"	6,480	98	12	24
OK1PCL	"	5,143	53	16	21
SM6AWA	"	4,257	74	10	23
N9ART	"	4,107	54	13	24
OH7EU	"	3,190	52	11	18
JI1TLL	"	1,496	25	11	11
JH1EBU	"	1,700	29	9	11
SM7BNG	"	1,334	34	8	15
JA3NMV	"	312	8	6	7
JM1NMB	"	36	4	2	1
Y23UA	14	19,656	168	16	47
OK3AUI	"	15,498	172	13	50
KL7IBT	"	10,498	99	11	32
W9JUV	"	9,950	71	14	36
DL9DU	"	8,484	155	10	36
LA8WG	"	6,840	125	11	27
KB7NV	"	5,642	65	11	20
YO6HQ	"	861	42	4	17
YO3ABL	"	144	6	4	5
Y23TL	"	36	4	2	1
OK1DCP	7	22,935	237	13	42
Y26EI	"	7,344	140	8	28
JA2QBA	"	2,775	40	11	14
JAØBMS/1	"	2,368	50	8	8
OH6DC	"	969	28	6	13
SP9EEE	3.5	1,575	77	4	17
SP9JCN	"	1,150	51	4	19
YO5TA	"	330	31	3	8
UB5IPN	1.8	4,587	120	7	26
OH9OM	"	2,613	65	7	32
SP9GDB	"	1,392	60	4	20
OL1AZM	"	1,200	57	4	20
OK2PAW	"	1,144	54	4	18
OK2BMU	"	820	43	4	16
OK3CVA	"	104	13	2	6
OK3CAA/P	"	24	5	2	4

CHECK LOGS

Our deepest thanks to the following stations who sent in check logs:

AG3S. C5AT (Opr. OH2FQ), DK3OI, DL8IH, EA6FD, F5AI, G5AWH, HA1SN, HA5VG, K6ZDL, K6ZUR, KB5FU, LA2KD, LA5BS, LA7LX, LA7SI, LA7SP, LA8CJ, LA8UX, LA8XM, LA9FY, LA9HC, LZ1IA, LZ1KDP, LZ1KVF, LZ2CC, LZ2DB, LZ2DX, LZ2KKK, LZ2KKZ, LZ2KRR, LZ2YY, N1NN, N2CAP, N7CT, NN4B, OE7SHI, OH1EB, OH1TM, OH2BCR, OH2BE/CT3, OH2NL, OH5LJ, OH6DE, OH6NH, OK1BB, OK1FAI, OK1FIM, OK1IAR, OK1KIR/P, OK1KSH, OK1US, OK1XJ, OK2BOB, OK2BUY, OK2SW, OK3CLR, OK3CQD, OK3TMF, OZ1CBW, OZ1FGW, OZ7LZ, PA3AFF, PA3AWI, PA3BIH, PA3BSZ, PAØATY, PAØCF, PAØHT, PAØLEG, PAØLRK, PAØPLM, PAØPN, PY2BR, BY28PR, PY2CPU, PY2TM, PY3CNW, PY3YEX, SM2DIR, SM2LIY, SM4ASI, SM5APS, SM5ARL, SM5BDV, SM5KMU, SM5RH, SM6AYM, SM7IDF, SM7IWN, SM7KHN, SM7LBI, SP1KAA, SP2AJO, SP2KFX, SP2RS, SP2ZT, SP3AIJ, SP3DAH, SP3ZDB, SP4EAK, SP4EDQ, SP5AFL, SP5AGT, SP5BR, SP5LCG, SP5LGT, SP6ANY, SP6FER, SP6PZV, SP7AW, SP7BCA, SP7KTE, SP8FNA, SP8GSC, SP8GUV, SP8ILO/5, SP8JMA, SP9BMH, SP9EML, UA1AWO, UA1CIQ, UA1OCT, UA1QAV, UA1QBV, UA1TBP, UA1TCO, UA1WAP, UA1WEA, UA1ZCL, UA1ZCZ, UA3AGL, UA3AHX, UA3AMR, UA3DAM, UA3DCX, UA3DFK, UA3DFS, UA3DFV, UA3DKF, UA3DL, UA3DNV, UA3DOQ, UA3DOS, UA3DRT, UA3DSS, UA3EAH, UA3EAL, UA3ECF, UA3ECJ, UA3ICF, UA3LAR, UA3LCC, UA3PBY, UA3PGC, UA3RAD, UA3RSN, UA3TDK, UA3XBB, UA4AA, UA4ACA, UA4CCB, UA4CDC, UA4CGF, UA4HAN, UA4HBP, UA4HFK, UA4HLX, UA4LX, UA4MX, UA4NCI, UA4WCE, UA4YAB, UA4YAZ, UA6AKT, UA6ARP, UA6EAE, UA6HKN, UA6LLI, UA6PCH, UA6PCJ, UA9AFI, UA9AHS, UA9CHQ, UA9CIH, UA9COB, UA9COT, UA9LAC, UA9MK, UA9SBM, UA9SDB, UA9WFB, UA9WFJ, UA9XAB, UA9XWF, UA9YBR, UA9YFG, UAØJDX, UAØKBC, UAØKBE, UAØKBH, UAØKCL, UAØLCM, UAØNH, UAØSGJ, UAØSY, UAØWAE, UB5AEM, UB5EES, UB5EU, UB5FCE, UB5FDM, UB5HBG, UB5ICD, UB5IPJ, UB5JCA, UB5JKW, UB5JPF, UB5LIE, UB5LJD, UB5NBO, UB5OAE, UB5QDD, UB5QDU, UB5RS, UB5UBI, UB5UBU, UB5UKX, UB5VAA, UB5VAW, UB5ZBG, UC2AHL, UC2LBE, UD6DFY, UF6FAL, UF6FBX, UH8EAD, UI8IAJ, UK1AAA, UK1OAP, UK2AAG, UK2GAB, UK3EAZ, UK3MAA, UK3MAE, UK4WAK, UK5FAD, UK5IEG, UK5UBE, UK5UBF, UK5ZBD, UK6FAA, UK7LAF, UK9OAE, UK9SBD, UK9WBY, UK9XAN, UK9XXA, UKØLAD, UL7EAH, UL7G8P, UL7PBI, UL7TAM, UL7TAY, UM8MCY, UO5ODA, UP2BEL, UP2BEP, UP2BFE, UQ2DZ, UQ2GBR, UQ2GDL, UQ2GEI, UQ2MU, UR2RKG, UR2RKN, UT5LN, UT5RW, UV3CX, UV3DN, UV3HD/UF6, UV3NG, UVØBB, UW6FZ, VE1ACK, VK1DH, W1PWK, W5AS, W6FSJ, W8VSK, WB4BBH, WB4MBN, WB5ZKR, Y21CF, Y21FL, Y21IC, Y21YH/A, Y22EO/A, Y22ML, Y22TD, Y22YJ, Y23BF, Y23IM, Y23KD, Y23MA, Y230J, Y23ZF, Y24GF/A, Y24HF, Y24IF/A, Y24LA, Y24WL/A, Y25TO, Y26JM, Y26XM, Y27HL, Y27IO, Y27KO, Y310N, Y31SC, Y32UE, Y33VA, Y33VL, Y41ZM, Y43VI, Y44XI, Y45YA, Y46XL, Y47YM, Y47ZG, Y48ZF, Y52VE, Y53YN, Y53ZA, Y53ZF, Y55XL, Y67XL, Y67ZG, Y68WG, Y75YL/P, Y86VL, YO3CDN, YO5AY, YO5CCV, YO5KAD, YO7BKI, YO8FZ, YU3EIJ, YU7ADA, YV1DQU, YV3IUP, ZL1AGO, ZL3GQ, 1S7DX.

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(Determined by field strength tests)

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RD2S

THE WORD IS OUT

The SSII 5/8 Wave Antenna exhibits 9db gain over a RD2S Tuned Rubber Duck and 3db when collapsed to a 1/4 wave . . . The word is out, of all 5/8 Wave *HT* Antennas tested only the SSII when collapsed to a 1/4 wave exhibited gain over a Rubber Duck. In fact, all other 5/8 wave *HT* Antennas tested were 1 to 4db below a Rubber Duck in the collapsed mode. In the 5/8 wave mode the SSII was equal to or exhibited as much as 2db gain over all other 5/8 wave *HT* Antennas tested . . . and the RD2S Short Duck was equal to or exhibited up to 4db gain over all other rubber ducks tested.

With SSII's modular construction you can replace or exchange any of the 5 types of base connectors available (BNC, TNC, PL-259, Tempo/Mot, F—type) . . . plus the telescopic section may be replaced for only $5.00, another Tuned Antenna exclusive. The tuned loading coil/spring is soldered to the machined end caps not swedged . . . and there are no ticky tacked capacitors or leads in the SSII's loading coil to break.

There are no short cuts in designing and building antenna's at these high frequencies. Soldered connections and antennas actually designed and tuned on the *HT* are mandatory to achieve maximum reliability and performance.

The Tuned Antenna Co. is the only manufacturer that specifies the gain of their 5/8 Wave *HT* Antenna in db at 1/4 wave and 5/8 wave over a rubber duck. These gain figures have been obtained from extensive field strength readings, using HT's and *HT* Antennas for the test . . . maximum effective radiated power is the result of efficient antenna design. Remember 5 watts into a 50 ohm dummy load with an swr of 1.1:1 = 0 erp.

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W4FA presents the reasons for and the techniques of monitor modulation. It's not just for getting some pretty scope pictures as we talk.

Practical Ideas On S.S.B. Modulation Monitoring

Part I—Why And How To Measure Modulation

BY JOHN J. SCHULTZ*, W4FA

With the great proliferation of speech processing units for use with s.s.b. transmitters, it becomes more important than ever to have a good means of monitoring a transmitter so output distortion can be avoided. This allows maximum benefit to be derived from the speech processing being used without causing "splatter."

Undoubtedly, the best way to monitor the output of s.s.b. transmitters is with some visual presentation such as that provided by an oscilloscope. This article discusses some of the basics involved in monitoring the output of s.s.b. transmitters for distortion and then goes on to some practical ideas for getting the necessary equipment together for continuous monitoring of an s.s.b. transmitter.

Distortion of the type that causes "splatter" is generated when the p.e.p. capability of a transmitter is exceeded. It is not necessary to know the actual p.e.p. output of a transmitter just to monitor for distortion, but it is often possible to determine it in the process of setting up a system to monitor for distortion. And, of course, if a monitoring system indicates distortion at some power level far below the rated p.e.p. output of a transmitter, it should lead one to suspect a problem in some stage of the transmitter.

Assuming for a moment that we can properly display the r.f. output of a transmitter on an oscilloscope, various displays will be obtained, depending on the audio input to the transmitter. The input possibilities are speech, noise, and tones. Speech is too variable for test setup purposes. Noise can provide some useful information, but specialized test equipment is necessary. So, tones usually are used in testing an s.s.b. transmitter. Fig. 1 shows some of the displays that will be obtained from a "healthy" transmitter when anywhere from one tone to an infinite number of tones are used.

The two-tone test is the most commonly used because it provides a readily recognizable display and because a definite power relationship exists between p.e.p. and average power. One could use three or even more tones, but the pattern formed becomes confusing and the power relationship changes. For the two-tone test the average power is half the p.e.p., with p.e.p. being defined as the RMS power developed at the crest of the modulation envelope. For instance, if we had a calibrated oscilloscope and the peak-to-peak voltage of the two-tone pattern was 130 volts, the p.e.p. would be about 42 watts and the average power 21 watts for a 50 ohm system:

$$PEP = \frac{\left(\frac{130}{2} \times .707\right)^2}{50}$$

The relationship of peak to average power being in the relationship of 2:1 only holds true for two tones. However, not all transmitters are designed to have a continuous power output of one half the p.e.p. rating, depending on power supply components, heating of components, etc. Depending on how skimpily a transmitter is designed, the continuous power output rating may be only one fifth of the p.e.p. So, the p.e.p. level which can be generated using the two-tone test might be less than one expects, although this should be the exception rather than the rule with most present generation s.s.b. transmitters. However, even if one cannot measure the peak-to-peak voltage of the waveform, it does provide a visual peak reference on the oscilloscope which should not be exceeded when a more complex input, such as speech, is used with the transmitter.

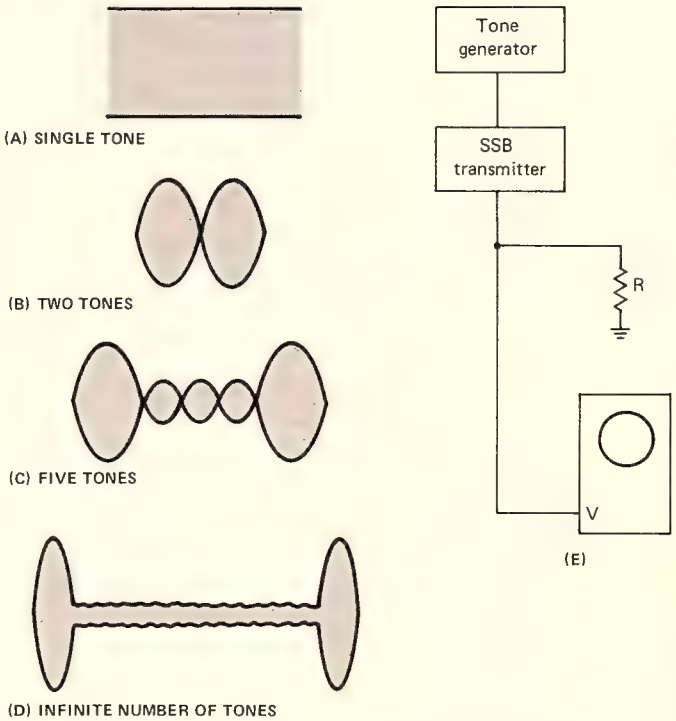


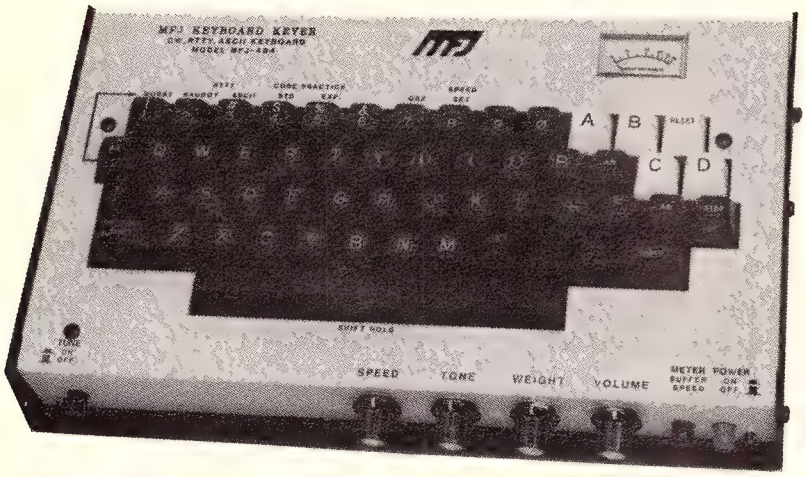
Fig. 1– The various oscilloscope display patterns that result from using different numbers of equal-amplitude, linearly mixed tones fed into the audio input of a properly adjusted s.s.b. transmitter.

A source of two tones is, therefore, a necessity if one is going to properly set up a system for monitoring possible distortion in an s.s.b. transmitter. Any tone generator which can generate two low-distortion tones which have approximately a 3:1 or less frequency ratio is suitable, so the main distortion products created still fall within the r.f. passband of the transmitter. The sharper the passband in a transmitter, the closer together the two tones should be, with ratios down to 1.5:1 being used.

A particularly good but relatively simple two-tone generator is shown in fig. 2. Two RC phase shift oscillators are used, one operating at approximately 700 Hz and the other at approximately 2000 Hz. Output stages are associated with each oscillator and provide some isolation for the oscillators and also perform the mixing of the two tone frequencies. If the components

*c/o CQ Magazine

MFJ Super Keyboards



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MODE 1: CW

The 256 character (50 for 494) **text buffer** makes sending perfect CW effortless even if you "hunt and peck."

You can preload a message into the buffer and transmit when ready. For break-in, you can stop the buffer, send comments on key paddles and then resume sending the buffer content.

Delete errors by backspacing.

A meter gives buffer remaining or speed. Two characters before buffer full the meter lights up red and the sidetone changes pitch.

Four programmable message memories (2 for 494) give a total of 256 characters (30 for 494). Each message starts after one ends for no wasted memory. Delete errors by backspacing.

To use the **automatic messages,** type your call into message A. Then by pressing the CQ button you send CQ CQ DE (message A).

The other automatic messages work the same way: CQ TEST DE, DE, QRZ.

Special keys for KN, SK, BT, AS, AA and AR.

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MODE 2 & 3 (RTTY): BAUDOT & ASCII

5 level Baudot is transmitted at 60 WPM. Both RTTY and CW ID are provided.

Carriage return, line feed, and "LTRS" are sent automatically on the first space after 63 characters on a line. This gives unbroken words at the receiving end and frees you from sending the carriage return. After 70 characters the function is initiated without a space.

All up and down shift is done automatically. A downshift occurs on every space to quickly clear garbled reception.

The buffer, programmable and automatic messages, backspace delete and PTT control (keys your rig) are included.

The ASCII mode includes all the features of Baudot. Transmission speed is 110 baud. Both upper and lower case are generated.

MODE 4: MEMORY KEYER

Plug in a paddle to use it as a deluxe full feature memory keyer with automatic and programmable memories, iambic operation, dot-dash memories, and all the features of the CW mode.

MODE 5: MORSE CODE PRACTICE

There are two Morse code practice modes. Mode 1: random length groups of random characters. Mode 2: pseudo random 5 character groups in 8 separate repeatable lists (with answers).

Insert space between characters and groups to form high speed characters at slower speed for easy character recognition.

Select alphabetic or alphanumeric plus punctuation. You can even pause and then resume.

MORE FEATURES

Automatic incrementing serial number from 0 to 999 can be inserted into buffer or message memory for contests.

Repeat function allows repetition of any message memory with 1 to 99 seconds delay. Lets you call CQ and repeat until answered.

Two key lockout operation prevents lost characters during typing speed bursts.

Clock option (496 only) send time in CW, Baudot, ASCII. 24 hour format.

Set CW sending speed before or while sending.

Tune switch with LED keys transmitter for tuning. Tune key provides continuous dots to save finals. Built-in sidetone and speaker.

PTT (push-to-talk) output keys transmitter for Baudot and ASCII modes.

Reliable solid state keying for CW: grid block, cathode, solid state transmitters (-300V, 10 ma Max, + 300V, 100 ma Max). TTL and open collector outputs for RTTY and ASCII.

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9-12 VDC or 110 VAC with optional adapter.

MFJ-494 is like MFJ-496 less sequencial numbering, repeat/delay functions. Has 50 character buffer, 30 character message memory. Clock option not available for MFJ-494.

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MFJ-54 LOOP KEYING PLUG-IN MODULE. 300V, 60 ma loop keying circuit drives your RTTY printer. Opto-isolated. TTL input for your computer to drive your printer. $29.95 (+ $3).

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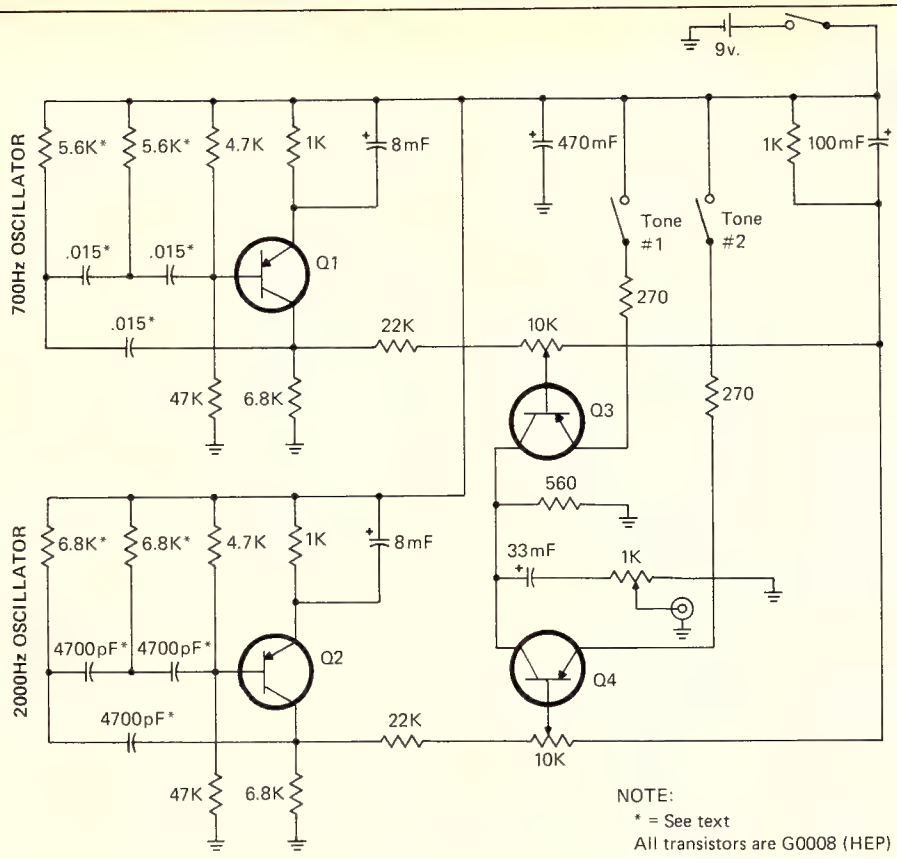


Fig. 2– This two-tone generator uses rather old-fashioned transistors, but all parts are readily available and it works well. The two 10K potentiometers need only be trim types for initial adjustment.

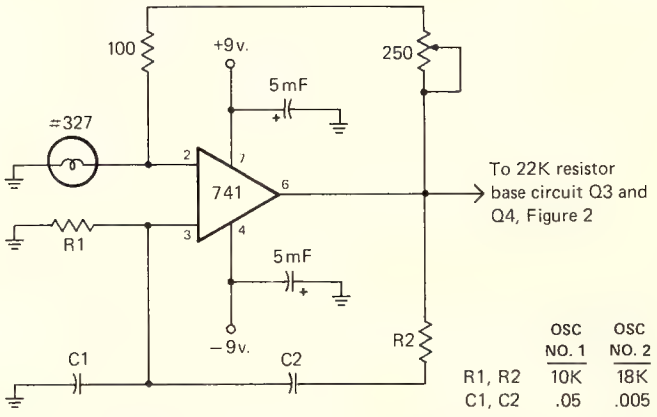
Fig. 3– Two 741 oscillators can be used to replace oscillators Q1 and Q2 in fig. 2. The 250 ohm trim potentiometer allows for adjustment for minimum distortion in the sine-wave output. Note that two 9 volt batteries will be needed with this circuit.

noted are chosen carefully so that the R's and C's match each other closely, the generator will have a very low distortion output. No adjustments are required other than to use a meter (if its frequency range when measuring a.c. volts is sufficient) or an oscilloscope to set the amplitude of the two tones at the same level. If one has the means to actually measure audio distortion (such as an audio distortion analyzer), the circuit of fig. 3 might be of interest to replace the RC oscillators (Q1 and Q2) shown in fig. 2. The circuit has a provision for balancing out the distortion generated, and by means of the adjustment, the distortion can be gotten down to a small fraction of a percent.

In either case, the generator should be battery powered (9 v transistor radio type) and constructed in a shielded enclosure. There is nothing critical about the wiring, and simple point-to-point wiring will suffice. The bi-polar transistor circuit should work right-off without difficulty. The 741 circuit normally will present no problems either, but its output should be checked, using an oscilloscope, to ensure that no spurious high-frequency oscillations occur simultaneously with the audio frequency tone generation due to poor bypassing, etc.

Since the output of the generator will be fed directly into the microphone input of a transmitter (or into the microphone input on a speech processing unit), the unit usually can be constructed with the mating type of audio connector mounted directly on the enclosure. Thus, an interconnecting cable can be avoided. Doing this with the standard 1/4-inch phone plugs is pretty simple, since a cable-type male plug can be disassembled and the plug chassis mounted. Other types of microphone connectors may require a bit more ingenuity in construction.

There are several ways one can get to "see" the output envelope of an s.s.b. transmitter. If one has an oscilloscope where the vertical amplifier has sufficient frequency range to cover the amateur band(s) of interest, there is little more involved than connecting the oscilloscope as shown in fig. 1 and adjusting the horizontal sweep for a suitable display. At higher power levels a simple resistor divider network is used to reduce the voltage input to the vertical amplifier to values within the oscilloscope's capability.

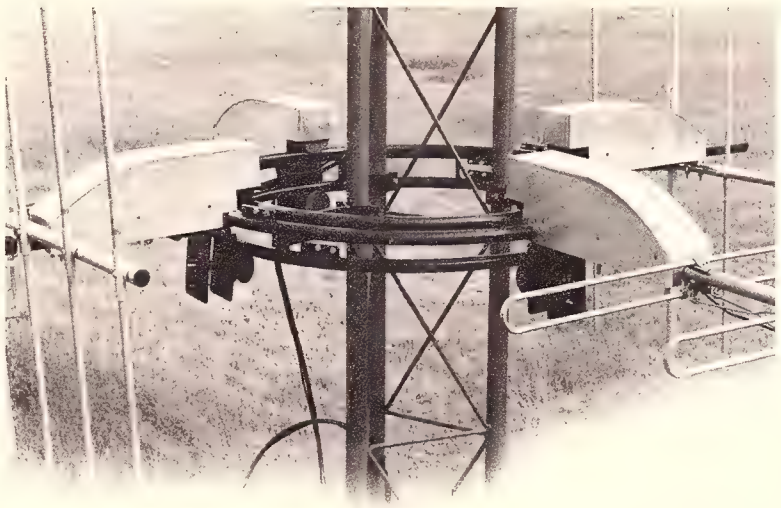


	OSC NO. 1	OSC NO. 2
R1, R2	10K	18K
C1, C2	.05	.005

Most amateurs do not have such expensive test equipment, although one may be falsely lead into believing that inexpensive oscilloscopes are suitable. For instance, a "5 MHz oscilloscope" will display r.f. waveforms, using its vertical amplifier input, up to 20 MHz or even more. But, when the input frequency exceeds the rated frequency, the vertical amplifier in the oscilloscope not only provides less gain, but it also acts as a low-pass filter for the input signal. So, imperfections on the input signal are masked, and harmonic components that the input signal may really contain are filtered out. One, therefore, must be careful to remember the imperfections inherent in using an oscilloscope beyond its rated frequency range, although the patterns obtained appear to be normal!

(To Be Continued)

In our next installment we will take up this discussion with oscilloscope modifications. By modifying a conventional oscilloscope to monitor modulation, one can enjoy the benefit of having two pieces of equipment in the shack: a modulation monitor and an oscilloscope.



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Here's a way to give 75 meters a try with a simple and easy-to-build antenna.

The 75 Meter "City Lot Special"

BY TOM TORGERSON*, KA0JPT

If you live in the city on a small lot and are restricted to low heights for your antennas, but would like to put out a really good signal on 75 meters, this may be for you. Size versus performance, this antenna is hard to beat. The numerous requests for information and diagrams I have received while on the air with it prompted me to write this, for other amateurs may have use for it.

The highlights of the antenna are: (1) The smaller size—only 80 feet long, 30 feet wide, and 26 feet high. (2) It compares or exceeds performances against dipoles at 50+ feet and even a bobtail curtain. (3) It doesn't need to be "out in the clear" of surrounding objects to perform well; both sides of my loop are 15 feet from my neighbors' houses. (4) It doesn't require an elaborate, or any, earth ground. (5) Since it's low to the ground, it can easily be repaired from storm damage, and experimenters can get at it easily for different modifications. (6) It performs equally well day or night, since it has properties of both low- and high-angle radiation.

General Description

The heart of the system consists of two helically-wound verticals stacked one above another on one pole. The basic theory behind a helical is that you can greatly shorten the physical length of the antenna by coiling the wire used. A rule of thumb is that to see electrically a quarter wave, a half wavelength of wire should be used. For a 75 meter quarter-wave vertical I needed a half wavelength of wire, or 120 feet for each helical. The top of the helicals are connected to a loop which may be thought of as a huge capacitance hat. To lower the angle of radiation still further, two lengths of wire drop down from the loop at a distance not far from the helical connection points connected by a crossbar of wire. In effect, there are four parts vertical and two parts horizontal. This is worked against a floating ground located just under the loop on the far side of the helicals. It is fed with thin lead to the helicals and regular stranded wire to the floating ground.

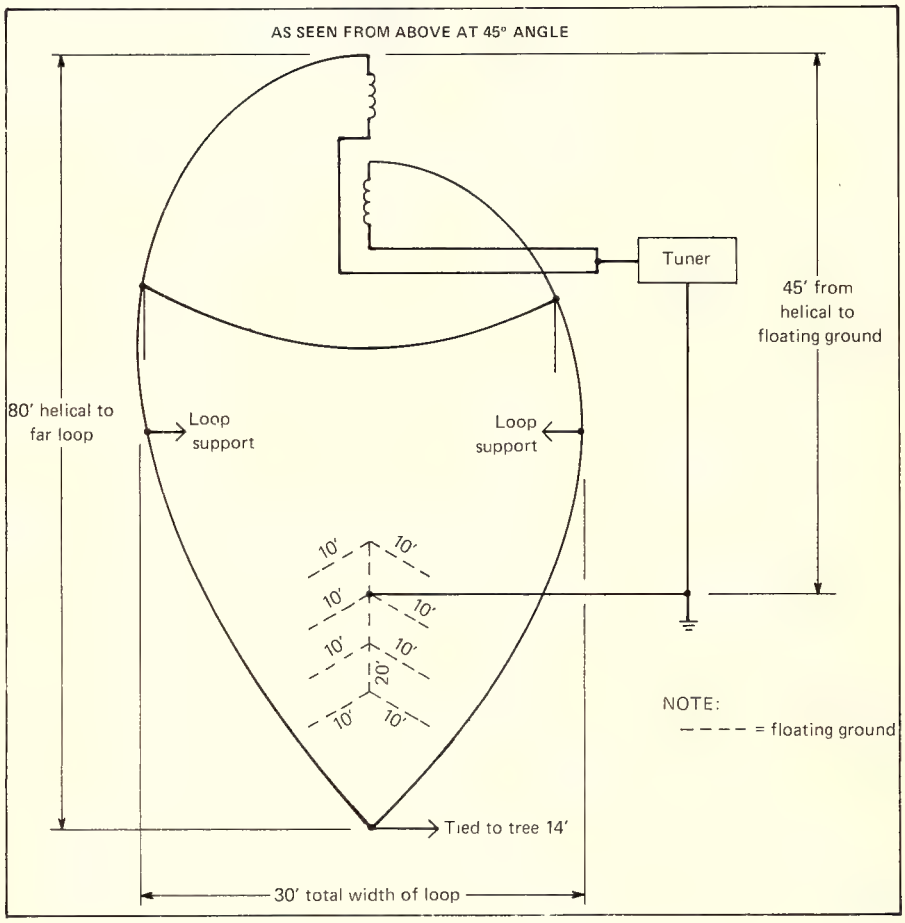

Fig. 1– The overall 75 meter "city lot special" antenna.

Details

The overall system is shown in fig. 1. The helicals close up in fig. 2 show the feeding method. Fig. 3 gives an alternative floating-ground construction. The total length of wire used, excluding lead-in, was 500 feet. Each helical required 120 feet, the loop 120 feet, the floating ground 100 feet, and the crossbar (fig. 4) 40 feet.

I used a 1¼ foot diameter 14 foot bamboo fishing pole for the helical supports, using 12 feet for the helicals and leaving the bottom 2 feet clear. The wire for the helicals is the same as for all other sections. I bought five rolls of 100 foot insulated stranded wire from Radio Shack, which cost me around $25. The larger the gage of the wire, the better, keeping in mind the particular diameter and length of your helical support pole. One point needs to be stressed here and that is that any section can be varied considerably in size as long as the basic configuration is followed. For example, the loop need not be exactly 120 feet; it could be, say, 80 to 160 feet, depending on what you have to work with in a certain section. The tuner will automatically phase the system together, since the radiated signal is a resultant component of (1) the helical verticals, (2) the loop, (3) the crossbar, (4) the structure of your floating ground.

I supported the helical pole by tieing it to the back of a basketball hoop I happen-

*3638 N. Bryant, Minneapolis, MN 55412

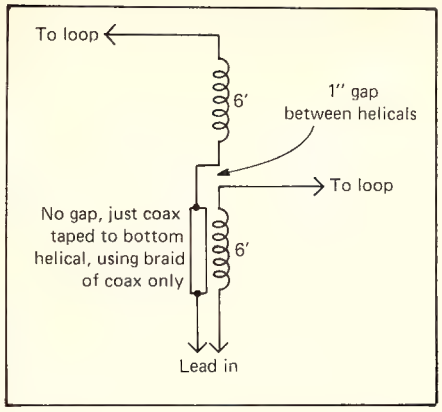

Fig. 2– Helical portion and feeding method.

ed to have on my garage. The vertical crossbar legs are held in place with 6 inch TV standoff insulators at the bottom of the outside of the top of my house at 26 feet, going to a tree tied at 14 feet high. The floating ground is in the attic of the house, which makes the floating ground about 20 feet high.

Fig. 1 shows the lead-in going at a right angle to the right, when in fact the feed line comes away at a right angle towards the tree and house. I wanted to make the figure easier to understand by going to the right. I used 96 feet of regular transmitting 72 ohm twin lead shorted together at the tuner terminal. The floating ground lead-in is, in my case, near 25 feet using insulated stranded wire. It might be better to use the inside of regular coax, but I haven't tried that.

The antenna tuner can be most any homebrew or commercially made one, fed as a long wire. The helicals make for fairly critical tuner settings because of the inherent narrow bandwidth of any helical. I normally run 500 watts p.e.p. and find no problem with my helicals shorting or changing of s.w.r. after prolonged transmissions. If you are primarily interested in long-haul or DX work and aren't concerned with a loss in high-angle performance, try the following. It increased my east/west coast reports +5 dB. Take

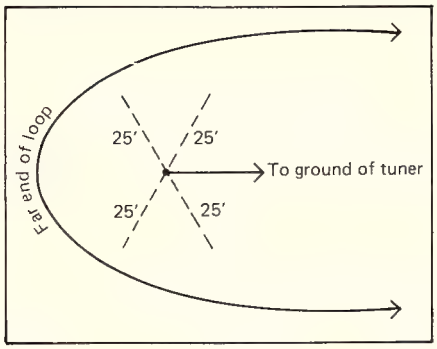

Fig. 3– An alternative method of constructing a floating ground.

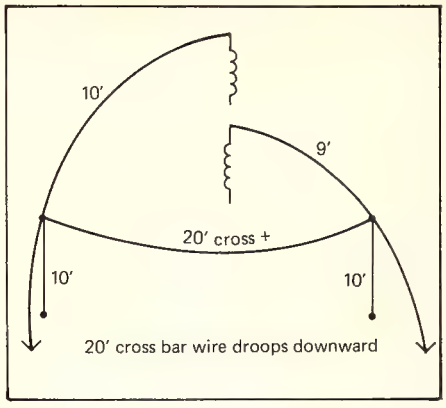

Fig. 4– The crossbar connection.

the cover off your tuner and with an alligator clip connect the floating ground to the hot lead going into the tuner from the transmitter side. Then connect an external earth ground to the tuner's chassis. The helical feed is the same.

In conclusion, I think if you try building this antenna, you will be more than pleased with the results. Once made, it's relatively easy to move to another QTH, since the helicals are already wound and the pole just needs to be put in place. Since there is so much latitude in the basic configuration, experimenters should have a field day modifying sections for maximum results.

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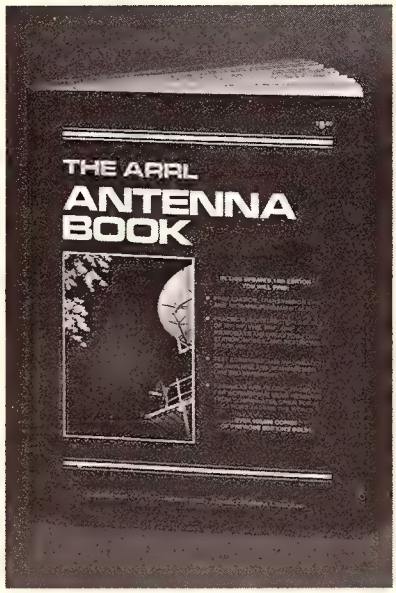

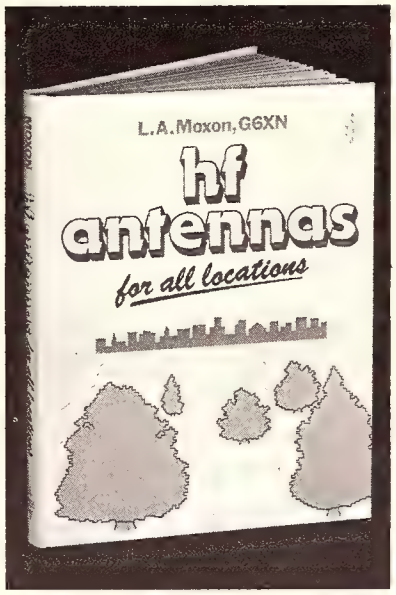

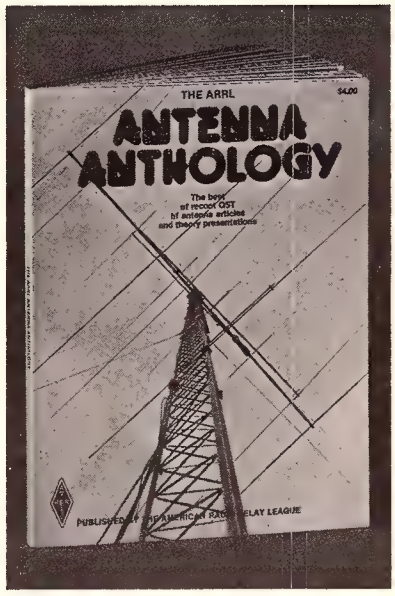

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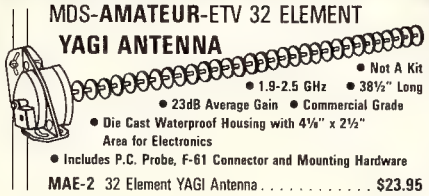

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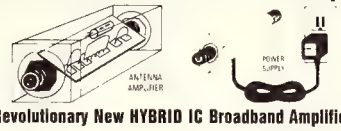

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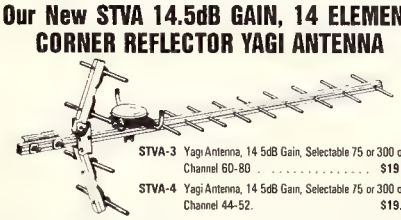

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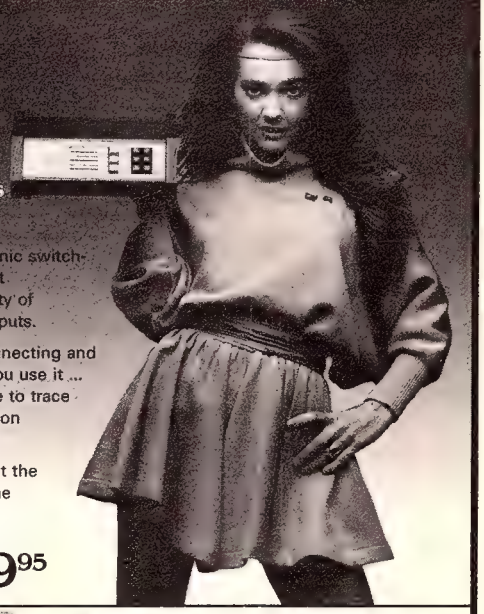

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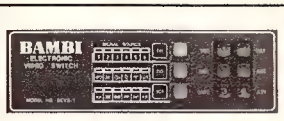

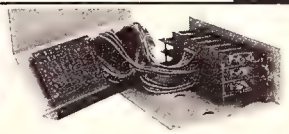

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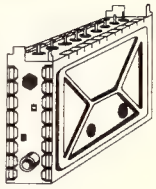

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WB9FRM gives us some helpful, hands-on tips for rolling our own PC boards.

A Printed Circuit Board Primer

BY ALAN MARCUS*, WB9FRM

I have rarely been successful in wiring electronic projects on perforated boards. The end result has always been messy, and often the contacts turn out to be intermittent. But, whenever I use a printed circuit board, the project works the first time. Unfortunately, finished PC boards are usually expensive, unavailable, or require the use of a good 35 mm camera and copy stand. I suppose that I'm like most amateurs who have spent over $1000 for ham equipment. I'd rather not spend a few hundred more for photographic equipment. But I have found that making PC boards need not be expensive or difficult.

The non-photographic methods that you might want to try include: (1) using a resist pen; (2) placing tape pads and lines directly on the circuit boards; (3) making a negative without a camera.

The Resist Pen

The resist pen method works, but I feel it is a very poor method. A resist pen looks like a felt-tipped pen which, in fact, it is. However, resist pens contain an ink that is resistant to the acids used for etching circuit boards.

In the resist pen method, the circuit is drawn directly on the copper. As you might imagine, the ink does not always go on the boards evenly. Streaks are often apparent, and it is difficult to obtain an even, black appearance. This is, however, the least expensive way to make a circuit board. The pens generally cost less than two dollars.

If you insist on using this method, be sure to clean the board well first. You can do this by lightly rubbing the copper side of the board with 00 or 000 steel wool. Then handle the board by the edges so that fingerprints are not left on the surface of the board. Try to draw the circuit on the board just as it appears in the circuit-board pattern you are copying. If you are starting the circuit from scratch (that is, you're designing the circuit), follow the directions about it in process (3), Making a Negative With a Camera. If you make a mistake with the resist pen, the ink will be difficult to remove. Use the steel wool to remove the portion you drew in error, and redraw the circuit correctly. Allow a few minutes for the ink to dry.

The board can most easily be etched by immersing it in a bath of ferric chloride. Dry chemicals are available, but they require mixing.

Ferric chloride can be obtained at Radio Shack and from Kepro Circuit Systems, Inc. (address given later). The etchant should be put in a non-metallic container. Plastic or glass bowls are fine. Although many PC board kits suggest that the board be placed in the acid right side up, I suggest that the copper side be placed down. **Remember to exercise caution. The acid could easily cause severe eye problems.**

The warmer the etchant, the less time the board will take to etch. Optimum temperature is 95 degrees Fahrenheit. I normally pour enough acid in an old jar and then submerse the jar in a little water in a sauce pan. This gives the effect of a double boiler. The pan is then placed on a hot plate or stove. Since the board will take between 20 minutes and 1 hour to etch, it is important to have new acid constantly come in contact with sections of the board. You make sure that is happens through a process known in the photographic trade as agitation. To agitate the solution, gently rock the bowl back and forth. You won't have to do this constantly, but the more frequently you do it, the faster the board will etch. After about 20 minutes, lift the board with an old wooden stick to see if the board has etched completely.

If any copper remains where the board should not have any, leave the board to etch some more. You will have to be very patient if you want good results. When the board has completely etched, fill the rest of the bowl with water, remove the board, and flush the board and bowl with lots of running water. Put the board aside to dry. When it is dry, drill the holes where you want them. Do not use a regular $\frac{1}{16}$" drill bit. Many people try to drill holes that size because it is sometimes difficult to find small circuit-board drills. The drills are available from Kepro, from some hardware stores, and from some electronic distributors. A #60 drill is a good all-around choice. If you have a very fast (20,000 r.p.m.) drill such as the Dremel or Weller tools, they are preferable to using a regular ¼" drill, but either will work. When you have completed drilling the board, use the steel wool once more to clean the board. Now you are ready to mount the components and solder them in place.

The Tape Method

A slightly more expensive but much higher quality board can be made by using the tape method. Begin by purchasing a PC board layout kit. I use one manufactured by Kepro. The kit is available from Newark Electronics, 500 N. Pulaski Rd., Chicago, IL 60624. Newark does have a $25 minimum charge, but if you buy all of the PC board materials and some of your parts from them, you will probably exceed that minimum. They will also send you a catalog free of charge.

The Kepro Photo Layout Kit consists of tape dots, tape strips, graph paper, a sheet of clear acetate, red acetate, peel-off letters, and directions.

As in each of the methods mentioned here, it would be wise to plan your board on graph paper. The kit contains two sheets of $\frac{1}{10}$" scale paper. When making your drawings, conserve as much space as possible. The difference between the amateurs and the pros seems to be how much space is used. I use the following spacing for component leads: ½" for 1/2 watt resistors, ⅞" for 1 watt resistors, ½" for small glass diodes, and 1" for 2 watt carbon resistors.

Use a ruler to determine where each pad should be on the copper board (but try not to touch the board with your hands). Fold back one of the pad backing strips so that the edge of the pads have no backing. Place the edge of an X-Acto knife under a pad, and your thumb on the top, and lift the pad from the rest of the backing sheet. Place the pad over the location desired and firmly press the pad on the copper surface. If the pad wrinkles or tears, it can easily be removed the same way and a new pad put down.

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Determine which pads should be connected. Using the X-Acto knife, lift a tape strip from its backing sheet. If too long a piece is taken, the strip may coil and stick to itself, so be prepared to cut off the length you need with a pair of scissors. Use the knife to press one end of the strip on the edge of a pad. The end of the strip should not cover the hole in the pad. Then press along the rest of the strip. If you would like the strip to curve, press and turn the tape very gradually. With practice, you will be able to make sharper radius curves. If the tape wrinkles quite a bit, remove it and try again. A few small wrinkles will not hurt.

Making IC pads is rather difficult with this method. Self-adhesive IC pads are available from Vector and several other suppliers, and these pads are preferable to trying to make your own from narrow tape strips. Once the board is designed, and the tape is pressed firmly in place, the board is etched as in the previous method.

Making a Negative Without a Camera

The last method, making a negative without a camera, is more expensive than either of the preceding methods, but it is much more accurate. And, as an added bonus, you can make as many boards of the same design as you like without going to much more work. The trick is to use Kepro's photo reversing film. Newark carries the film under stock number 19F2010. The film is relatively expensive, but two 10″ × 24″ pieces of film are included in the kit along with the developer and the directions.

The major difference in using this method and the tape-on-board method is that you begin by putting the pads and strips on the acetate sheet found in the layout kit. This is done exactly the same as is done on the copper board. When the acetate sheet has been taped with pads and strips, you are ready to put down the IC pad. In this process, however, I chose to use Datak's rub-on pads. They go on perfectly, but you have to put them in the right position the first time, or you'll ruin the pad. If you make a mistake, carefully scrape off the old design with a knife.

Datak makes another product that you may want to use to label your boards. They make rub-on letters. They work perfectly if you are careful. Datak products come from the Datak Corporation, 85 Highland Avenue, Passaic, NJ 07055.

The letters are placed on the acetate in the same fashion as is the design: so you can read it from left to right. The result is a positive, not a negative.

To make a negative, you will need to buy a #2 photoflood bulb. I bought mine at a neighborhood photographic store for $2.35. You can put the lamp in any regular bulb socket, but you must be able to bring the lamp within 10 inches of the acetate.

The acetate is placed face up (right side up) on a piece of glass. I used the glass in the Kepro Photo Process Kit (Newark stock #19F2002). The kit also contains sensitized boards, developer, and etchant. Now, you must remove the negative film from its sealed envelope. However, the film is sensitive to fluorescent light and most bright lamps. I take the film out in the light of a flashlight covered with red cellophane. The cellophane is included in the kit. Place a sheet of negative film on the work table, roll up the rest of the film and put it in the bag, and seal the bag. Cut a piece of film that will make a negative the proper size. The sensitized boards are 3″ × 6″. It is rather difficult to do the cutting in dim light, but do the best you can.

The film is placed on the acetate so that the emulsion of the film is away from the acetate. The emulsion side is much duller than the other side. If in doubt, you can scratch the emulsion with a knife. Put another piece of glass over the film. Turn the whole package over. Then expose the package to the light of a #2 photoflood that is held just 10 inches away. The exposure time is 3 minutes.

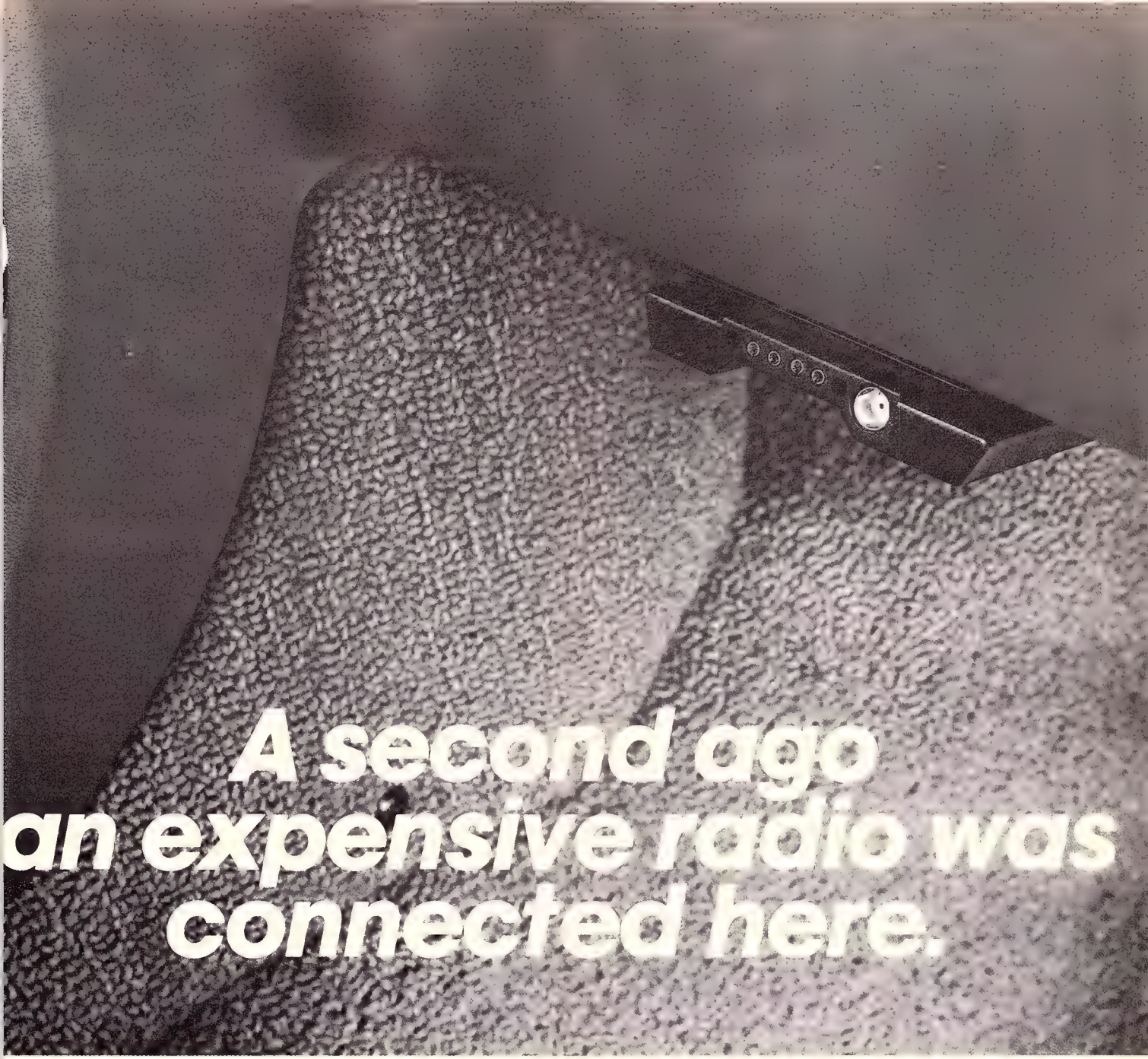
After the exposure, remove the film in the light of your homemade safelight. Pour a little of the developer (it's rubbing alcohol) on the emulsion side of the film, and lightly rub the film with cotton balls. The imitation (nylon) cotton balls work just fine. Do not rub hard. After a minute or two, the emulsion will come off the film in all the areas where your final design will be. You may shine the flashlight quite close to the film now to make sure your entire design has appeared. When satisfied that it has, you may turn off the flashlight and turn on the room lights. Next, wash the film in cool running water to remove all of the developer. Then, put the negative away to dry. I dry mine by putting clip leads on the ends of the negative, and by hanging the wire over a nail in my workroom.

When the negative has dried, you are ready to make the finished board. Under your safelight, remove a presensitized circuit board. Be sure to seal the rest of the boards back in their original package. Put the board you are working on face up on the work table. Place the negative on top of the board so the negative looks the same as you want the finished board to look. Any printing should read from left to right just as it normally appears in print. Place the glass over the negative, place the clips on the edge of the board, and expose this combination to the photoflood. The lamp should be the same distance away, but the exposure should be for 6 minutes. The board is then inserted in a bath of developer solution. The immersion time is 2 minutes. The development should be done in dim light. When the board is removed from the developer, a slight image will be seen. As the board dries, the image will become more prominent. Let the board dry at least 2 hours. Professionals use an infrared oven to dry the boards in a few minutes, but room drying will work fine.

When the board has dried, put the board face down in the ferric chloride solution, and process the board as before.

After the board has been etched, cleaned, and drilled, you will be ready to mount components. I'm sure that you will be delighted with the results.

If, however, you want to try an even more exotic process, you might want to use the GC Electronics Company's product called Lift-It. The Lift-It process will permit you to copy articles directly from magazines. The Lift-It process is considerably more expensive than those processes described, but if you are copying a great many designs from magazines, you might want to try that process. And, if you want the ultimate in circuit-board processes, you'll go out and buy that $1500 Nikon single-lens-reflex camera, a copy stand, and a good close-up lens. Until you do, I know that you'll enjoy the simpler processes I've outlined here.



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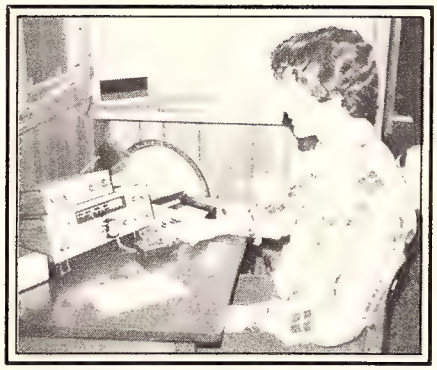
HW-8 Mods Revisited: CWF-3 Audio Filter

Alas, one of the drawbacks of including commercially produced items in an article is that while the article lives on, the commercial items fade away into oblivion. Thus has it been with the MFJ CWF-3 audio filter featured in the original series of modification articles. Luckily, R.T. Cronau checked with MFJ after purchasing the reprint series and discovered that the CWF-3 has been out of production for several years, and the only filter available in p.c. board form (wired and tested) is the CWF-2 super-filter for $19.95. This filter could be used in place of the CWF-3, but its four sections far exceed the needs and abilities of the HW-8. So, I had better "fill in" the gap left by the CWF-3 by giving its circuit and a suggested construction approach on the Radio Shack DIP-1 p.c. board brought to our attention by NØARQ (see the QRP Column, *CQ*, May 1982, p. 98).

The c.w. filter circuit is shown in fig. 1. It uses the two sections of the popular "747" integrated circuit which comes in a 14-pin dual-in-line package. Two levels of filtering selectivity are available by selecting the filtered output from either one or both of the active sections with SW1. The filter center frequency is 750 Hz, which works well with the filter already in the HW-8. Cin/R1 provides input isolation, while C1/C2/R5/R2 and C3/C4/R8/R7 determine the filter center frequency and passband characteristics. Usually, one attempts to use components in these networks which are matched as exactly as possible, but for the present application exact matching is not a necessity. Five percent tolerance polystyrene capacitors at C1/C2/C3/C4 provide best accuracy, but silver micas will perform adequately. In fact, if the suggested construction approach is followed, silver micas will be necessary (disc ceramics will serve in a pinch) for fitting on the DIP-1 p.c. board. Likewise, ¼ watt resistors will be appropriate.

83 Suburban Estates, Vermillion, SD 57069



The tidy desktop operating position of Rob Magro, KA2EGO. Rob, age 17, worked WAS and 26 countries in his first 11 months of operation.

A suggested approach to construction is shown in fig. 2, which makes use of the Radio Shack DIP-1 (Archer Cat. #276-159) dual-in-line experimenters p.c. board; the unneeded half of the stock board is simply cut off. Fig. 2 shows the *foil side* of the DIP-1. Some simple modifications to the stock board are necessary, and consist of scraping away the foil material at the shaded areas with the sharp tip of a knife, screwdriver, or file. Removing this foil material creates several extra pads at desired points. Second, several jumper wires are used to connect indicated pads. The jumper from pin 13 to R3 can be run on the underside of the board. Alternately, one could eliminate the jumper wire entirely, mounting R3 underside between pin 2 and pin 13 directly. Note that R6 is mounted underside between pin 5 and pin 12 pads. While I have not tested this arrangement, it should work without any problem. The CWF-3 has never been prone to feedback oscillation.

Details for inserting the filter into the HW-8 are covered in the August 1977 issue of *CQ*. I've had to do more reprints of the series of HW-8 articles, and these are once again available at $7.00 for the batch. Proceeds above cost of printing and mailing the reprint sets support the cost of the DXCC QRPp Trophy program, as well as the FD Trophy program. The set includes the HW-8 test report (May 1977), modification series (August, October 1977), R.I.T. p.c. board clarification (Jan. 1981), and NØARQ's R.I.T. p.c.b. approach (May 1982). The HW-8 continues to be a very popular rig indeed, and I'd hesitate to say how many of the guys have modified their units according to the above series of articles, but a heck of a lot have. So far, only about three have contacted me about a problem with the R.I.T. circuit, and those problems were "freaks."

Let's turn over some of this month's space to you operators who have taken the time to send in a report about your activities.

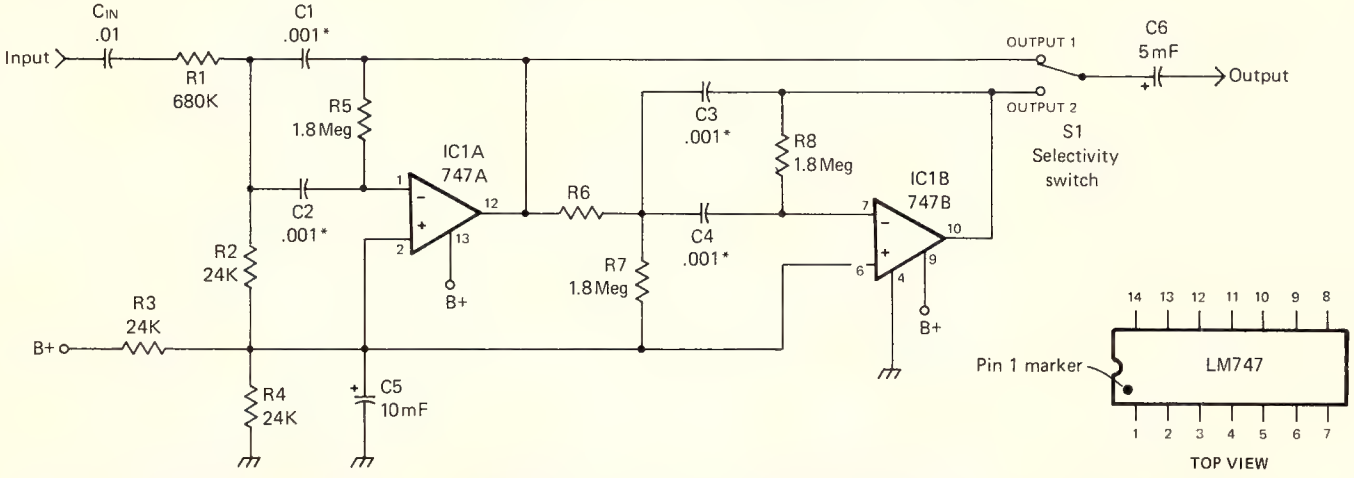
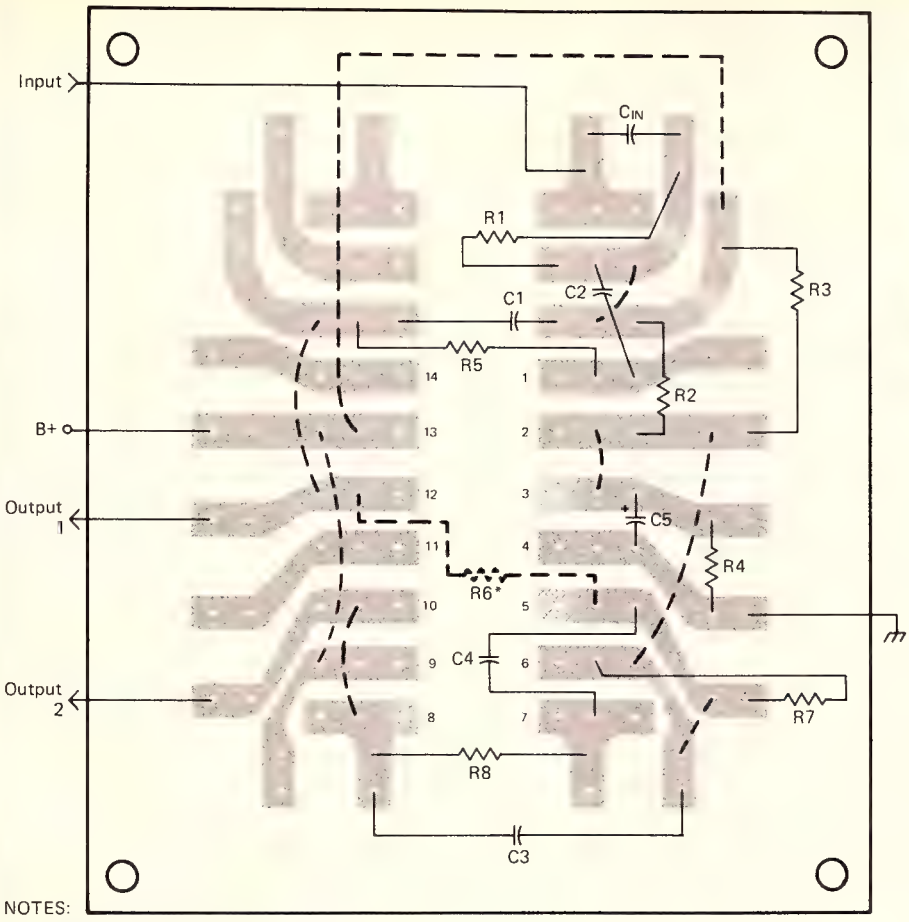
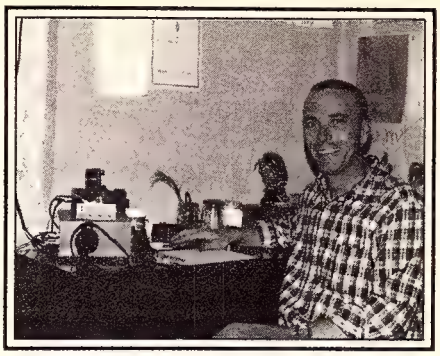


Fig. 1– The CWF-3 audio filter circuit. For best results, use 1000 pF polystyrene capacitors for .001 capacitors (C1–4); silver micas are adequate. Cin = .01 disc ceramic; C5, C6, miniature electrolytics. IC1 is CA747, LM747 type. R1–R8 = ¼ watt carbon.*



NOTES:
No connections at Pins 3, 5, 8, 11, 14.
All dashed lines including R6 are on foil side.
Remove shaded foil area with sharp tipped knife, screwdriver or file.

Fig. 2– Layout for the audio filter using Radio Shack DIP-1 (Archer 276-159) p.c. board.



The "austere" operating position of Burt, WB4RLQ/TA2BAV, during his QRP stint in Ankara, Turkey. The HW-8 is at the left edge of the desk under the TA2BAV QSL card. One watt output netted 27 states and 38 countries during the 5 weeks of sparse operation.

DX Extras

De WA1YIO, Brad Hutton, RR 9 Box 223, Concord, NH 03301: "Just a note to let you know how much I enjoy reading your column in *CQ*. It was through your writings that I came to be quite fascinated with QRP operation. I bought an HW-7 at a flea market two years ago . . . naturally it didn't work quite right so it was some time before I made my first contact with it. I worked 20-odd states with it before deciding I had to have an HW-8. What an improvement over the HW-7! In just two weeks I've worked 31 states and 15 countries with it.

"*DXCC QRPp* is my goal, and it may take some time, but that's the fun of it. I have 5 Band WAS #693 and did that with dipoles and a Drake T-4XC barefoot. I have noticed that the fellows obtaining *DXCC QRPp* usually run the Argo and/or the HW-8 as a 'starter' rig. I generally (for the past six months) run my Drake T-4XC at 5 watts or less output showing on the meter of the MN-2000 antenna matching network. Can I legitimately (for award purposes) use this method to work toward *DXCC QRPp*? Of course, the HW-8 does not have 10 meter coverage, which is a serious drawback for obvious reasons. It can probably be done with the HW-8, but it would take a long time and lots of patience, I'm sure."

The answer to Brad's question is "yes," the T-4XC may be used to make legitimate, valid contacts for QRPp awards *as long as his output power does not exceed five (5) watts c.w., or 10 watts p.e.p.*, the internationally accepted QRPp (or QRP if you like) power limit. Measurement of output power should be on an accurate meter in such a case. Generally, the meter should have a separate, low power range not exceeding 20 watts full-scale for QRP output measurements.

De K8LJQ, Jess B. Lebow, 355 Mower Rd., Pinckney, MI 48169: "All my QRP operating is done on 40 and 15 meters at the 200 mw level. I am using the International Crystal oscillator/pax combo on each band. I started the project in 1975. I've worked 34 states on 40 using the vertical described below, and on 15, I've managed 25 states and 28 countries! WAC at this level has been achieved also.

"On 15, a TA-33 at 50 feet has produced RST's from 219–599 at the 200 mw level. (Hi!) Takes a lot of perseverance by the other operator to pull me through, and these operators deserve my gratitude. My vertical for 40m is a bit unusual, and is the result of about 7 years of experimentation for a *sturdy* and *efficient* system. Year after year, antennas came down in the wind and ice, etc., and it was back to the drawing boards. The end product of all of this misery is a free-standing 14 inch Heights aluminum tower 32 feet high.

"The tower is insulated at its base by three fiberglass rod insulators machined on a lathe to fit snugly inside the three legs of the tower and tower base. For the ground plane, I use 36 quarter-wave radials at 1 inch under the soil, and an additional 500 square feet of "chicken wire" (mesh-type fencing) at 1 inch under the soil. *(This represents about what it takes, minus chicken wire, to achieve an efficient ground plane for a vertical—ed.)* RG-8U coax is run along the ground to the antenna base, and a base loading coil provides the proper match point for the coax center conductor. With the radials buried, mowing the grass is no problem, and I'm careful mowing in the area of the coax. I picked up the sections of the tower at hamfests for about $75, and a can of aluminum paint made them like new. The antenna works very well on 75 and 80 meters as a ⅛-wave vertical with appropriate base matching network. I never worry about it coming down in high winds now."

De KA2EGO, Rob Magro, 23 Bridge St., Milford, NJ 08848: "I am 17 years old and have been licensed for 11 months. I have been using an Argo 509, and I have found this small QRPp rig to be very exciting. As of yesterday, I worked my 50th state using only 5 watts and a CB vertical antenna. I am now applying for *WAS QRPp.* So far I have 26 countries with my rig and I can't wait to get the *DXCC QRPp Trophy* in the future! The key word in QRP operation is 'patience.' I know the world can be worked very easily, and a true QRPper never gives up. So, all you beginner QRPers out there, don't give up. It just takes time!" *(Well said, Rob!—ed.)*

De WB4RLQ/TA2BAV, Burt A. Vander Clute II, 891 Southview Circle, Fayetteville, NC 28301: "Here is a quick review of amateur activity in Turkey (1980), in-

cluding my own QRP operation as TA2BAV/QRP while I was in Ankara. As evidenced by the enclosed photo *(see elsewhere in this column—ed.),* my efforts were rather austere. I used a souped-up version of the HW-8 and a 'half-dipole'—that is, half of the antenna was inside my apartment and half of it was suspended over a convenient tree outside my window. The really amazing thing is that it worked!

"I got bitten by the QRP bug as a result of a QSO with Chris, G4BUE. While I was 599 at G4BUE with 75 watts into an SB-102, Chris was 599 here with 1 watt! In fact, after he lowered power, he was still solid copy in Ankara with 100 mw. That was it. I ordered the HW-8 the following week, assembled and modified the rig (your series of articles acting as my guide), and got on the air. What supreme fun! Within the space of five weeks, averaging one hour per day, I managed to work 27 states (from TA2BAV), 38 countries, and WAC on 20 meters with 1 watt output to my 'half-pole.'

"Gene Tyree, N4ANV, was my QSL manager, and we still have logs if anyone reading this still needs a QSL—legal-size s.a.s.e. please. Others operating QRP out of Turkey include Halit, TA1HY, Kemal, TA1MD, Kadri, TA1KD, and Ruchan, TA2DX. Most of these QRP rigs are homebrew tube-type units, although a few HW-7/HW-8's are in use. It is extremely difficult for a Turk to get a commercial rig or even parts for construction projects. Any transmitter is highly valued by TA amateurs." Our special thanks to Burt for his rundown on TA QRP activity.

De WA3FNK, Tom Rhodes, 29 West Church St., Williamsport, MD 21795: "Felt it was about time to add my story to the ones I've been reading with great interest in the QRP column. *CQ's* treatment of the subject of low power is excellent, and you are to be congratulated on your efforts. After reading the DX column on a regular basis, I started to wonder if QRP could hold the same excitement as high-power DXing. Over the years I'd worked 147 countries with about 300 watts input. Well, after three months, let me say that not only is QRP just as much fun, but a great deal like being a Novice again! I still feel a little sad that the old Novice 75 watt power limit went over the hill. It was a great teacher of many a big DXer of today. But that's progress. Novices need power, right?

"My original QRP attempts came during my Novice days after I purchased an old Heathkit AT-1 and Hallicrafter's Skybuddy. My success as a c.w. op was fair. Several months of 80 meter operation netted me about 20 states. I let my license expire for a while, and then my new XYL helped me prepare for my General. Started working DX about a year and a half ago.

"As I mentioned, I felt it was about time to give QRP a fair try about three months ago. My equipment was a Viking Navigator turned back to 2 watts output, and an old NC183D did a good job on receiving. Antennas are dipoles, a longwire, and an MFJ antenna tuner. I also have a TA-33Jr for the high bands. During the April QRP contest, I managed 7 states and 3 Europeans, all with a 40m dipole. I've learned that QRP and DXing have one thing in common—listening is very, very important. At present, totals are 42 states and 10 countries."

De KA4JGV, Jerry C. Bowers, 2516-C Celanese Rd., Rock Hill, SC 29730: "I wanted to drop you note to let you know that QRPp is alive in South Carolina. I purchased an Argonaut about two weeks ago and never dreamed the results would be so satisfying. To date, I've worked 14 states, including California, with 1 watt output. Maybe not very impressive to some, but I'm pleased! My current antenna is a 14AVQ with only two radials, but I hope to lay some more when weather permits."

That's space for reports this month. Let's round out with some notes.

Club and Activity Notes

Correction, QRP ARC I Membership Fee: In the May 1982 issue I erroneously indicated that the membership fee for joining the QRP ARC I is $4.00. Tom Davis gave me a call and noted that while he appreciated the publicity, he has had to send a lot of applications back, asking for an extra $2.00! I apologize profusely. The current fee is $6.00, which includes a subscription to the very worthwhile quarterly newsletter which covers construction articles, club news, activities, etc. At present, address queries/applications to Ed Popp, K5BOT, 2212 Deadwood Drive, Austin, TX 78744.

Incidentally, in case you missed the May 1982 column, the big news from the QRP ARC I is that the 50 watt maximum power limit has been dropped. Before that happened, if you had to run over 5 watts output for e.m.e. work, net work, or whatever, you could not be a member of the QRP ARC I. Now even part-time QRP operators can join and partake in club activities. All club awards (WAS-QRPp, WAC, "Thousand-mile-per-watt," etc.) follow the standard definition of QRP/QRPp: 5 watts maximum r.f. output (10 watts p.e.p.).

QRP activity in the Houston area continues to grow, with the last report showing the Houston Area QRP Club with a membership of around 40! In reading over the club newsletters, I'm envious of the opportunity fellows down there have for getting together at meetings and club luncheons and the like. The newsletter is put out by Leo Delaney, KC5EV, who notes: "It never ceases to amaze me how many amateurs have been turning to QRP for a new world of operating challenges!" Indeed, it seems true of Houston! For more info, write to the Houston Area QRP Club, P.O. Box 383, Spring, TX 77373.

Fred Bonavita, W5QJM, P.O. Box 12072, Capitol Station, Austin, TX 78711, edits and publishes the "Southwest QRPer," a neat little newsletter which includes articles about QRP ("QRP Mobile Operating" and the like), construction items, and news about the QRP Gulf State Net (QRP-GSN). The net can be found during summer months on 7040 kHz, 8 p.m. CDT, and during fall and winter on 3560 kHz, 8 p.m. CST, Wednesdays, with K5BOT as NCS.

The group featured a special QRP workshop on February 20 in Austin, and it was a great success, with a total of 27 hams showing up. Seven drove all the way from Houston, one flew in from Dallas, with the remainder coming from the Austin area. The afternoon events included talks about various aspects of QRP operation which were recorded and will be run in subsequent issues of "The Southwest QRPer." The newsletter has slowly been growing into a little magazine. Fred has been quite active in organizing the QRP Forum for the 1983 ARRL National Convention in Houston. Excellent job on all fronts, Fred!

The following are some of the QRP activities to come:

(1) Sept. 11/12, 1982, G-QRP-C Activity Weekend.

(2) Oct. 16/17, 1982, QRP ARC I Fall Contest.

(3) Oct. 30/31, 1982, CQ WW S.S.B. Contest with special QRP section.

(4) Nov. 11, 1982, Combined G-QRP-C/QRP ARC I Activity Weekend.

(5) Nov. 27/28, 1982, CQ WW C.W. Contest with QRP section.

(6) Dec. 26/31, 1982, G-QRP-C Annual QRP Winter Sports.

Details on these upcoming events usually can be found in *CQ's* Contest Calendar column, as well as in the newsletters of the sponsoring clubs. Join in the fun with other QRP operators!

73, Ade, WØRSP

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Safety and precaution can add valuable years to your rig. W1BG has come up with a simple way of protecting tube-type transceivers from being damaged.

The Superfuse

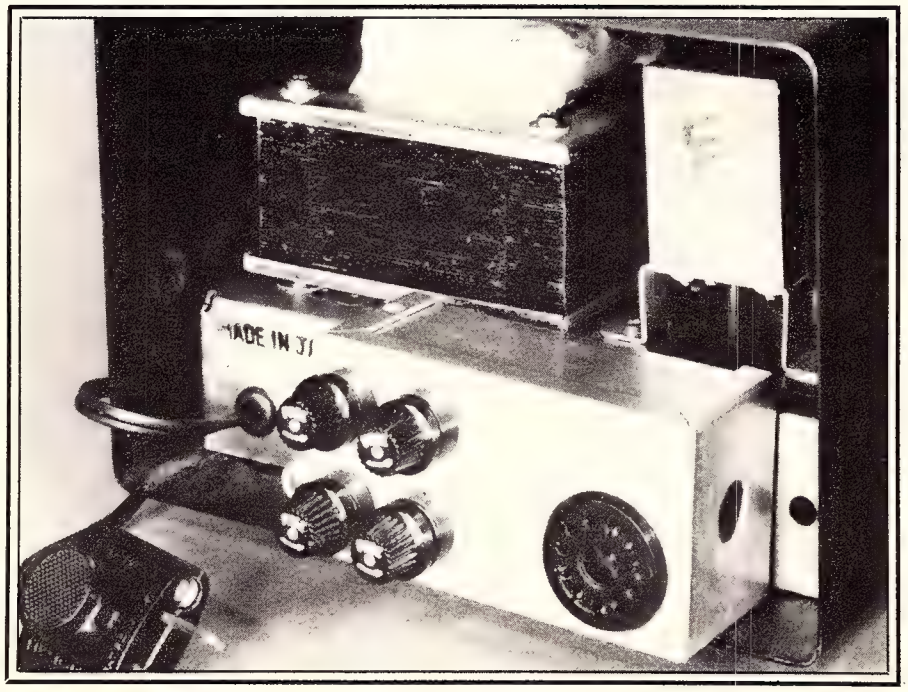
A Multiple Fuse Adapter for Older Transceivers

BY PENN CLOWER*, W1BG

If your transceiver has a power line fuse, you probably feel that it's pretty well protected—and you're probably wrong. The reason is simple: a fuse sized to handle maximum transmit power is way too big to give much protection during reception. A 250 watt s.s.b. transceiver may draw 350 watts from the a.c. wall outlet when transmitting. To prevent nuisance fuse blowing, the a.c. line will be fused at a slightly higher level—maybe a 5 amp fuse which would allow a 575 watt power draw. When the transceiver is receiving, the power requirements are far lower. A lot can go wrong, seriously wrong, before that fuse blows. The device described here can save you a lot of money, time, and aggravation. Specifically designed for the older tube-type transceivers, it is a multiple fuse adapter which plugs in between the transceiver and its remote power supply. A suitably sized fuse is placed in each of the d.c. supply lines in addition to the normal a.c. fusing, and the entire supply is disabled if any fuse blows.

Multiple fusing this way has several advantages. Since each d.c. supply line is fused at just above its normal operating level, a component failure in a low-level circuit can cause shutdown before massive problems occur. No longer is a several hundred watt increase in power-draw necessary to turn off the supply. Since the various voltage supply outlets are fused individually, the particular fuse failing in the event of trouble can provide a valuable clue towards locating the problem. Finally, since the superfuse circuit fits between the transceiver and its power supply, the addition (or removal when you sell the transceiver) of the circuit is a simple no-holes modification.

It is relatively easy to provide real fuse protection for many of the older tube-type transceivers. Popular rigs made by Heath, Swan, National, Hallicrafters, Galaxy, and others all had external a.c. power supplies. This means the all-important interface between the supply and transceiver is accessible for modification. In addition, one side of the input a.c. line is routed through the transceiver for a.c. power control, so turning the a.c. off by opening that line is also a simple matter.



A rear view of my Tempo power supply showing the superfuse riding piggyback on the power output connector. The fuse holders are marked as to amperage and circuit fused. Also note the fused a.c. plug, which was added as a simple means for fusing each side of the input line. (W1GSL photo)

The circuit shown in fig. 1 was designed for my Tempo One, but with suitable power connectors and fuse sizes it could be used on any of the previously mentioned equipment. As shown, it fuses four circuits, but the number can easily be extended. The circuit is quite simple. Each fuse is shunted by a neon bulb in series with a resistor: if the fuse blows the bulb lights. The neon bulbs are grouped around a photo-transistor, and when a bulb lights the photo-transistor turns on a Darlington wired transistor pair which drives a relay. When the relay pulls in, its normally closed contacts open the a.c. line feeding the power supply. A failure in any of the secondary circuits then cuts off the input to the entire supply. Of course, the power for the relay and the neon bulbs comes from that same power source, so what actually happens is that the superfuse chops the a.c. input to the supply on and off at about a 5 Hz rate as the various filter capacitors charge up and down. This cuts the average supply input power in half, thus protecting the other d.c. circuits and notifying the operator that a fuse has blown. The blinking panel lamps and clicking relay make it hard to overlook superfuse operation!

*459 Lowell St., Andover, MA 01810

Construction

As can be seen in the photographs, my version is built as a plug-in module sized to ride piggy-back on the Tempo One power supply. It could also have been permanently wired into the power cable connecting the supply and transceiver. My unit was constructed in a 1¾″ × 2″ × 4″ minibox. Everything fit inside, but it was a squeeze, and a larger box would have made construction much easier. A small circuit board is used to hold the handful of components. Layout is noncritical, although precautions should be taken to make sure that the various large supply voltages are safely separated from each other and the a.c. line.

The phototransistor is from PolyPaks. The catalog number 3277 is a bargain, having four transistors for a dollar, although it my case only three worked. That transistor is in a clear plastic package and can be surrounded with the neon bulbs. Phototransistors with a built-in lens would be much more difficult to optically couple to all four bulbs! The transistor and bulbs have spaghetti covering their leads, and the entire group is wrapped with household aluminum foil and Scotch tape. The shiny foil surface improves the optical coupling between the bulbs and phototransistor and also prevents false triggering due to stray light. *Make sure that the foil and wire bulb leads do not touch each other.*

I found experimentally that a ¾ mA bulb current would trigger the relay. To be on the safe side, the series resistors are selected to set the current at 2 mA if the fuse blows and the load is shorted. The required resistor is easily calculated: just assume the voltage across it is 60 volts less than the supply line being protected.

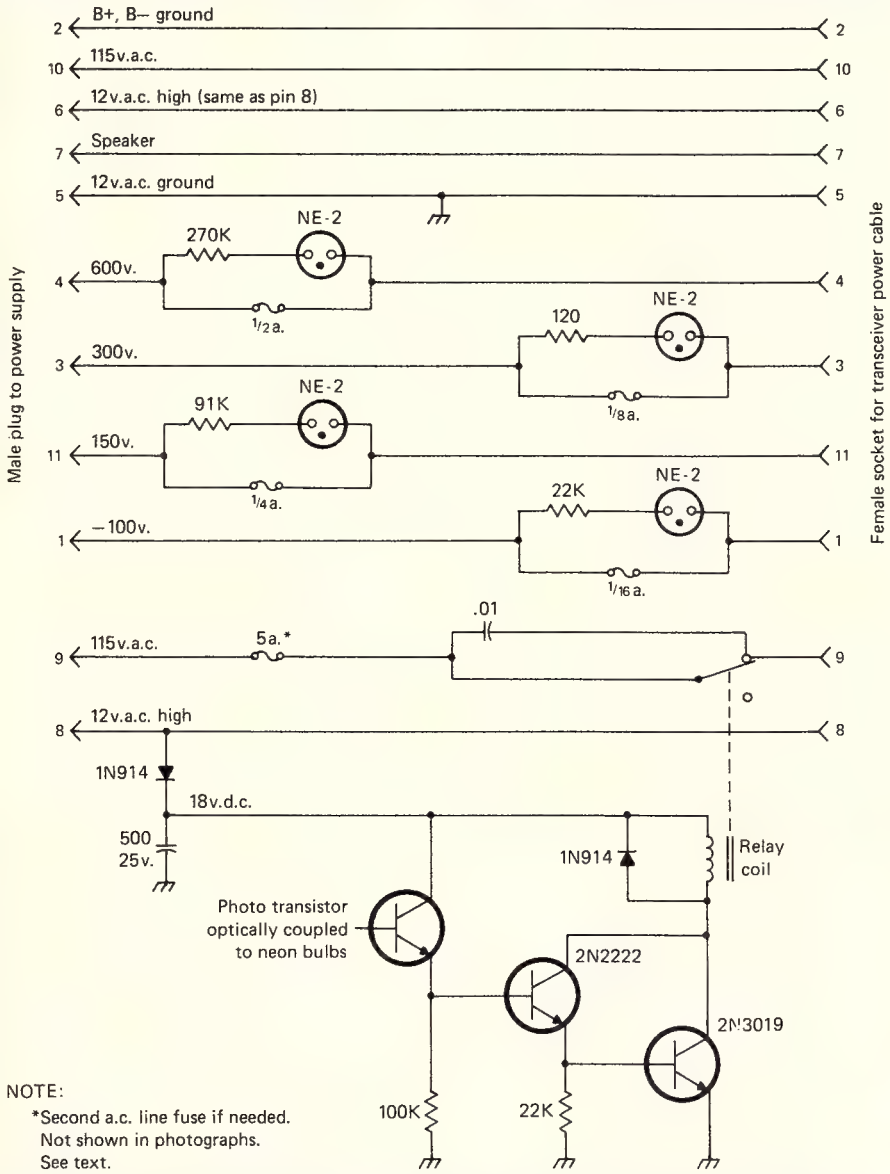
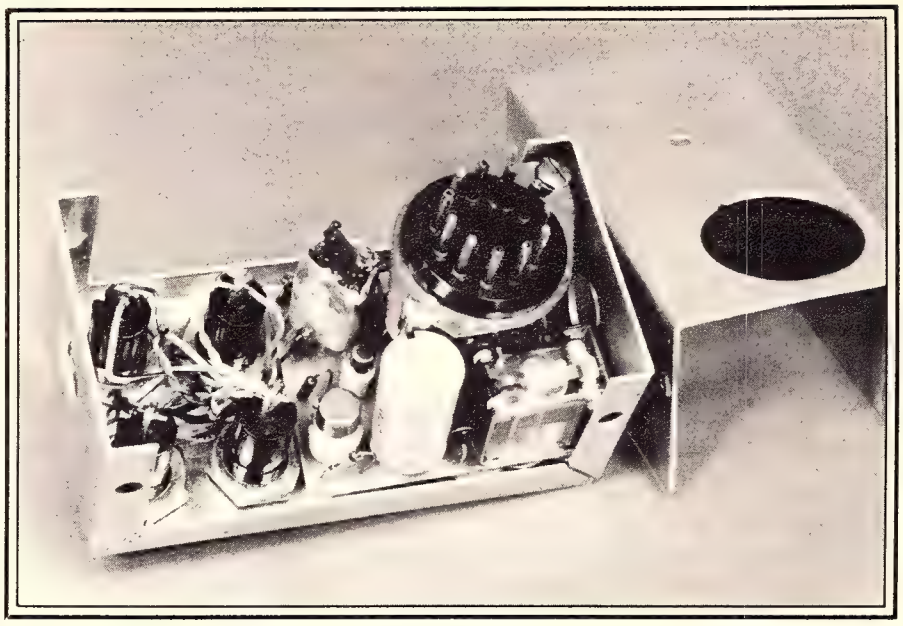


Fig. 1– Circuit of the superfuse. Note: the connector pin numbers and fuse sizes shown are for the author's Tempo One transceiver. Other transceivers will require different connector wiring and fuse values (see text). The transistors can be any medium-power, 100 mA, 1 watt switching types. The relay has a 12 volt coil with 5 amp contacts. The diodes can be anything rated at 100 mA, 50 p.i.v. or more.



Interior view of the superfuse. The neon bulbs are in the aluminum-foil-covered bundle on the PC board. Mounting everything in one half of the minibox makes a neat unit and avoids the hassle of long jumper wires connecting the two halves. (W1GSL photo)

For example, if the 600 volt output is shorted, the resistor will drop 540 volts, so a 270 K resistor will regulate the current at 2 mA.

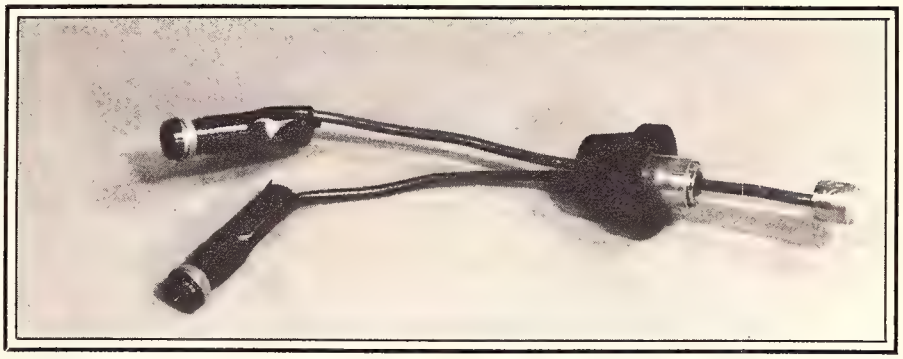
The relay should have a 12 volt coil with contacts rated at 5 amps or more. There are many suitable units on the surplus market in the $2 to $5 price range. The capacitor across the contacts prolongs the operating life by absorbing the make/break spark. The diode across the relay coil makes life easier for the driving transistor by clamping the voltage spike generated in that inductor when the transistor turns off.

Be sure to wire the fuse holders correctly. As a safety consideration, the power source should always be connected to the lug on the far end of the fuse holder. This gives the most protection against accidental shock when removing or replacing the fuse with a live circuit. As a bonus, it also defines the direction of current flow through the fuse and so increases the usefulness of a meter insertion tool which will be described shortly.

Checkout

Checkout of the completed superfuse can be done in several easy stages. First remove the fuses and use clip-leads to apply the proper supply voltages across the empty fuse holders. The bulb wiring and resistor sizes are correct if each bulb glows brightly when energized. Next, apply 12 volts a.c. to the appropriate pins of either power connector and check that 15 to 18 volts d.c. shows up on the 500 uF filter capacitor. Then power up one of the neon bulbs again and verify that the relay operates. The voltage on the bottom end of the coil should drop to 1.5 volts or less when any bulb is on. The relay coil in my unit draws around 150 mA, and the relay driver transistor will get warm unless it is fully saturated as indicated by a low collector voltage.

When those preliminary checks have been completed, the entire unit can be tested in the final arrangement. Put the circuit together as shown in fig. 1 and connect the superfuse to your power supply. Don't connect the transceiver yet,



A simple adapter for replacing a fuse with a milliammeter. Use it now to determine the best fuse sizes, and use it later (hopefully much later) as a valuable trouble-shooting aid. (W1GSL photo)

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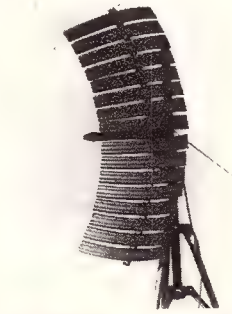

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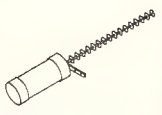

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TVI—Here We Go Again!

BY LEW McCOY*, W1ICP

In the July issue of *CQ* in Ted Cohen's "Dateline . . . Washington, D.C." column, Ted, N4XX, made mention of "Low Power Television . . . An R.F.I. Disaster in the Making." Ted, who incidentally has a long and distinguished record in fighting RFI (radio frequency interference), pointed out that there are already 6500-plus applications on file with the FCC for permits to operate low-power TV stations—10 watts for low band (Channels 2 through 13) and 1000 watts for u.h.f. I had just read Ted's column and then picked up our local newspaper to read that a local radio station had just filed for a 10-watt permit to operate on Channel 2! (Ted, if you are reading this article, say a prayer for me!)

Ted is not a person who is inclined to overstate or understate the facts. However, I am. A "disaster" is a gross understatement in my opinion. Before we dive into this article describing TVI let me be immodest and give you some of my background on this subject.

In the late 40's when television first started up for the general public, I was living in a Chicago suburb, happily operating a kilowatt and chasing DX (W9FHZ). Television was available for viewing in local bars, usually featuring wrestling matches and boxing. (I didn't live near any bars, so I had no TVI. Occasionally, I visited one-to view TV, of course.)

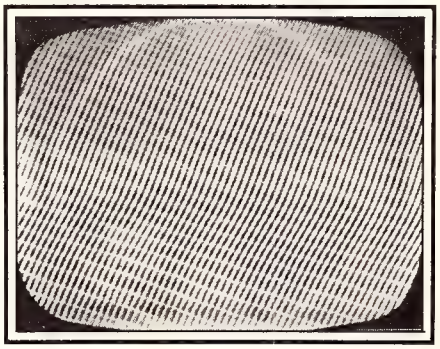
During this period, my wife and I took a trip east to visit the in-laws, and when we returned two weeks later, lo and behold I found that my next-door neighbor and fishing buddy had bought a TV set! It is still amazing to me how a good friendship can quickly be ruined by a little TVI. In any event, I sold our home and moved to the Ozark mountains to get away from TVI—and that's a fact. Just ask my wife, who nearly became my ex-wife.

However, as I discovered, the Ozarks are great for DX, but it is really no place to try to make a living (at least legally). A job opened up at ARRL headquarters in West Hartford, Conn., and I applied for the position and was hired. At that time television interference was something that was threatening the very existence of amateur radio. It was curable, but required some rather drastic measures on the part of amateurs and TV set owners. I was sent on the road to lecture on the causes and cures of TVI. Over a period of a few years I gave demonstrations in all of the then 48 states, covering some several hundred cities. Three huge packing cases were required to store and ship the two TV sets and transmitting gear.

If all this seems drawn out, just bear with me for a few more sentences and I'll get to the point. Eventually I guess I helped convince enough hams and TV servicemen that TVI could be cured. In thinking back now about those years, I guess the only reason I had been picked as the emissary was that I had once been a professional magician! Here is the point: From that experience I have become somewhat of a half-baked authority on TVI and RFI. And, in the years since, I have written many articles on RFI, which leads us up to this article. Believe me, we do have a disaster in the making.

This shows what happens to a TV set when your harmonic or other signal is zero beat (or close to zero beat with the TV carrier frequency).

An example of cross-hatching interference due to the signal beat between the TV and spurious signals. With modulation the cross-hatching will vary in intensity.



Severe cross-hatching with a rather unsatisfactory TV picture, to say the least. Keep in mind that normally the average amateur would never experience such problems. However, 10 watt TV stations will make this a common problem.

TVI in Recent Years

I know that I'll get arguments about this, but since about 1960 TVI has not really been a serious problem for amateurs. Before everyone goes for my jugular, let me explain. Several things happened in amateur radio and the TV industry to ease the problem. We found out that we had to have completely shielded and filtered rigs in order to operate near a TV set. The TV set must be equipped with a high-pass filter to prevent fundamental overloading from the strong amateur signal. This was the start, and it did a job (except in fringe areas of TV stations that only provided weak TV signals). Better v.h.f. and u.h.f. transmitting tubes (and better antennas) were developed. Gradually,

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the power output of TV stations increased until the normal TV station was transmitting many thousands of watts more than in the early days. Of course, the stronger the TV signal, the less chance for interference. Also, on the TV side, many set makers were installing high-pass filters as a precaution.

On the amateur side, we started running single sideband more and more until amplitude modulation was rare. What did this mean? In order to run s.s.b., the amplifier stages must be run in a linear fashion, Class AB1 or AB2, etc. The old-fashioned Class C operation, while more efficient, caused tremendous harmonic generation, hence more TVI. By going linear, harmonic generation didn't amount to much. In fact, many manufacturers of transceivers reduced shielding in their rigs (to our detriment). However, the FCC requirements are simply that any harmonic content from any low-band rig, 160 through 10 meters, only has to be down 40 decibels. In other words, running 1000 watts, FCC rules would okay a rig with one-tenth of a watt output in the TV channels; and take my word for it, a tenth of a watt could cause one nasty case of interference to a weak TV signal.

It was determined a long time ago that if a TV set was receiving a 1000 microvolt TV signal (incidentally, a weak, but good viewing signal), it could be interfered with by a 1 microvolt signal. In other words, visible cross-hatching could appear on the TV screen with that 1000 to 1 ratio. Before I go on, let me point out there are two basic types of TVI: the one caused by faulty design of the TV set, in that it cannot reject interference from signals that are on frequencies other than the TV channels; and the other, those signals generated by radio transmitters (called spurious signals) that fall in the TV channels and cause interference. The first, of course, is the fault of the TV set, and the other is the fault of the transmitter. There is another ground rule that should be thrown into this discussion. Most interference (over 90 percent) is caused by amateur operation in the 20 through 10 meter bands (and our new bands will also figure strongly in this area). Forty and 80 meter operation are not guilty of harmonic TVI problems except on rare occasions. V.h.f. and u.h.f. operation can cause TVI, but they are not the major problem (except 50 MHz operation and Channel 2) that exists from harmonics from 20 through 10. So our serious problems are the DX bands, plus 50 MHz operation interfering with Channel 2 (that is called adjacent channel overload, which is very serious, but it is the fault of the TV set design). We are getting into problems with cable television, so I'll touch on that, too.

Types of TVI

The problem is actually complex enough to attempt to break it down into sections. Let's consider low-band TVI

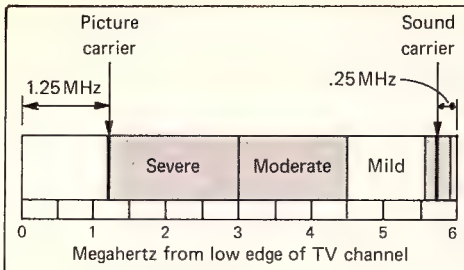


Fig. 1– This chart shows the frequencies involved in a TV channel. Any signal falling in the region close to the picture carrier will cause cross-hatching on the TV screen. The ratio of TV signal to spurious signal is important, but in dealing with 10 watt TV stations, most any spurious signal will create problems (see text). (Chart reprinted from ARRL Radio Amateur's Handbook, *courtesy of the ARRL.)*

Channels 2 through 13 first. Amateur harmonics are most likely to cause problems on Channels 2 through 6, and occasionally on Channels 7 through 13, although that is infrequent.

A TV channel is 6 MHz wide. The picture carrier itself is transmitted 1.25 MHz up from the bottom edge, and the sound carrier is transmitted 0.75 MHz down from the top edge. If we start at the bottom, Channel 2, we start at the top of the 6 meter band—54 MHz. Channel 2 would be from 54 to 60 MHz, and its picture carrier would be at 55.25 MHz. I won't bore you with mathematics, but let's take a quick look at what happens with harmonics. Any signal that heterodynes, or "beats," against the TV carrier signal can cause visible cross-hatching across the TV screen. How close the two signals are to each other is an important factor in determining the degree of interference. (See some of the accompanying photos.) However, any signal occurring from the edge of the TV channel to 3 MHz up from the edge can cause severe TVI. As you go up higher in the channel, of course avoiding the sound channel, the interference decreases. In fact, a strong harmonic can exist in the channel and cause little if any interference, but the signal placement is important.

Assuming a fourth harmonic from 14,050, we would have a harmonic in Channel 2 at 56.2 MHz. Remember our ratio of 1000 to 1. If the harmonic is, for example, 10 microvolts strong, and that isn't much of a harmonic, it would cause visible interference to a 10,000 uV TV signal, and that is a strong TV signal. As you can see, a 28 MHz second harmonic could cause havoc with a TV set tuned to Channel 2. That's why the CBers at 27 MHz have so many problems, even when they do run a legal 5 watts input! Fig. 1 is a drawing of a TV channel showing where the amateur harmonics could cause severe or moderate TVI.

Another type of amateur-caused TVI is the generation of v.h.f. parasitics from a low-band rig. The rig may be clean as far as harmonics are concerned, but it can, and many do, generate v.h.f. parasitic signals. If this parasitic falls in the proper relationship, severe TVI results.

Still another form of amateur TVI is the generation of harmonics via a non-linear rectifier. Let's say your neighbor has a TV antenna fed with twin-lead, and it had been up for years. The wires are loose and dirty, etc. When such a setup is operated near a strong r.f. field such as an amateur rig, the fundamental r.f. signal is picked up by the TV system. Normally, if the TV set had a high-pass filter installed, the amateur fundamental would be knocked down. However, when a strong r.f. field hits the loose antenna connections, tiny arcs of r.f. exist. These act as diode-type, non-linear rectifiers which in turn generate harmonics. These harmonics are fed into the TV set, going through the high-pass filter and causing TVI.

A good friend of mine, Mort Waters, had a bad TVI problem develop when operating 80 meters. To be honest, I had never seen a severe case of TVI from 80 meter operation. Usually the harmonics are just too high in frequency to have enough strength to cause TVI. But Mort had a bad case of TVI.

To make a long story short, after much, much testing, it turned out that Mort had an 80 meter dipole using a balun at the feed point. The balun had gone bad, had broken leads in it, and was acting as a strong non-linear rectifier, of course radiating harmonics to beat the band. So even with a clean rig, non-linear rectifier harmonic generation is something we must guard against—particularly in weak signal areas.

We have three types of interference that can be the fault of the amateur and are his obligation to clean up. They are harmonics or spurious signals, parasitics (also spurious signals), and the generation of signals via non-linear rectifiers, if such signals are generated at and radiated from an amateur's own location. Let me make that clear: If such signals are generated because of loose connections, bad wiring, etc., in our station or home, then it is our obligation to clean them up. If they are generated from our fundamental in the neighbor's wiring, then it is his problem, but of course there is a public relations problem involved there. More on that in a moment. That about covers "our fault."

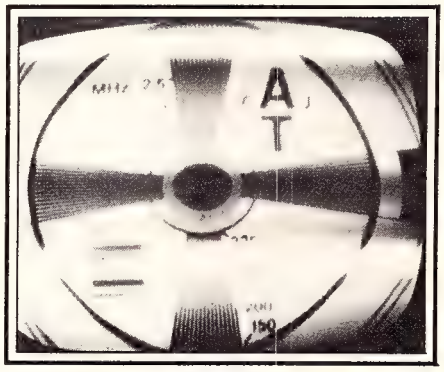
The TV Set, Cable Industry, and Who Knows Who Else's Responsibility

Of course, the end culprit is the TV set itself. Without it there would be no TVI. But let's face facts: It isn't going to go away. There are three important problems with the set itself. First, in order to avoid interference, it must receive a strong signal. How strong? For myself, I would be happy with anything over 10,000 microvolts. In most medium to large cities, such a signal is not hard to come by. In fact, if you can convince your neighbors to put up good outdoor antennas (they will receive better color), by all means do so. The best method of convincing the neighbors is to have a good set and TVI-clean installation to show in your own home. If you have a better picture than his, it is like your ham buddy getting an S7 when you are 40 over. He is going to do something about it!

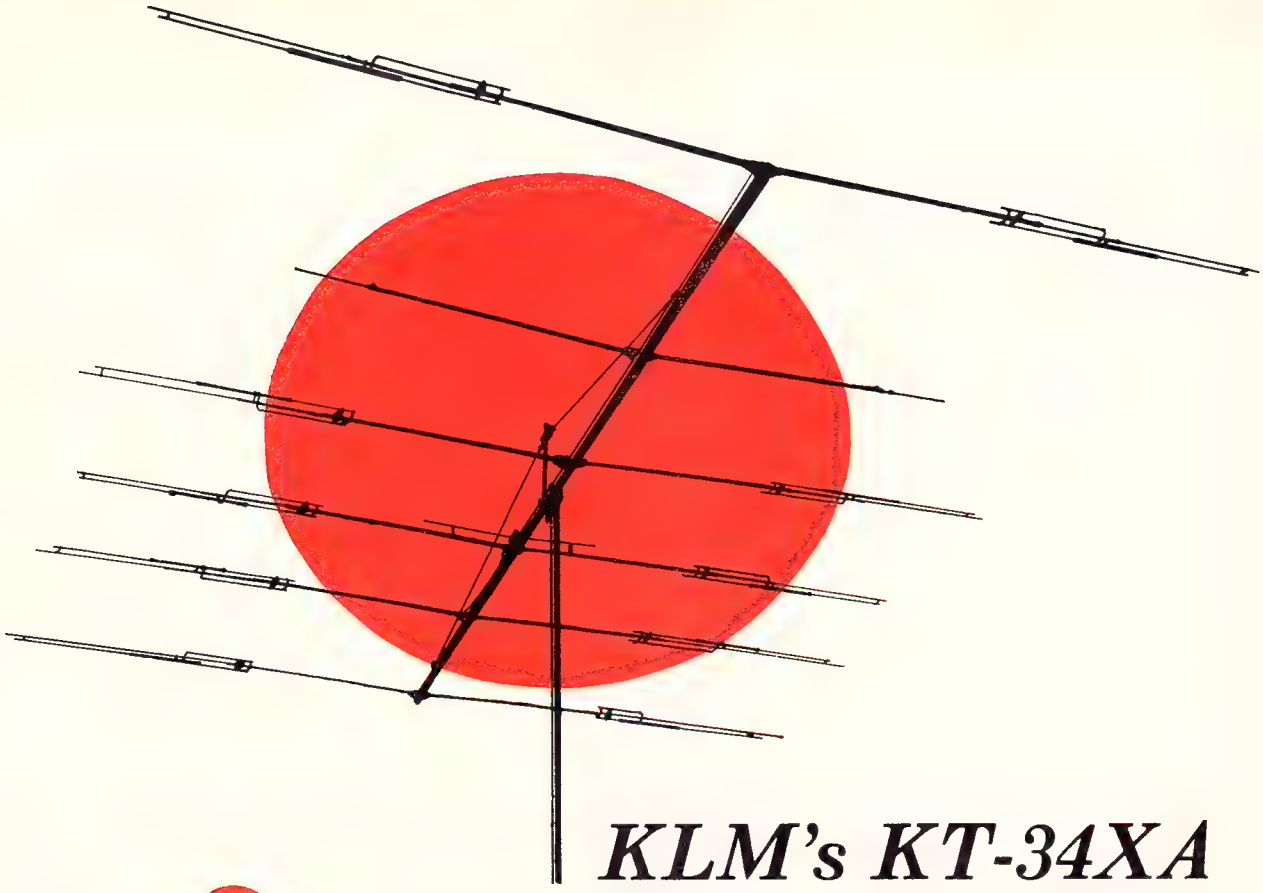
Many manufacturers (but not all) have built-in high-pass filters in their TV sets and many of those built in are minimal in performance. A high-pass filter is simply an electrical device that is installed on the antenna input of the TV set and will attenuate (stop) any signals below its cut-off frequency—usually around 40 MHz. In other words, it will stop your strong fundamental signal from getting into the set and smashing up the TV signal. Without the filter, your fundamental signal rides down the TV antenna lead, hits the first stage of the r.f. tuner, and drives it completely berserk. Instead of operating in a linear mode as it should, the r.f. (and following stages) generates strong harmonics and causes interference—usually on all channels. Keep in mind that while these harmonics are generated because of your fundamental signal, it is not your fault, but rather is the fault of the TV set. Usually, if a set has TVI on all channels, it means the cause is fundamental overloading and a high-pass filter is required (not your fault). So you have the three problems with the set: first, the need for a strong TV signal; second, a good high-pass filter; and third, the problem of non-linear rectification, which fortunately is rather rare.

Cable TV—Not a Salvation

When cable TV came along, we in amateur radio felt that we really had it made. Here was a system in which the TV signal was fed via a completely r.f.-tight system (coax, etc.) to the user's set. And for a while, it did help. However, the cable



This is the kind of interference one could expect with a harmonic that attenuated 40 dB—1000 times down! It is easy to realize that the TV set needs plenty of signal to work with in order to reduce this and the other types of problems discussed.



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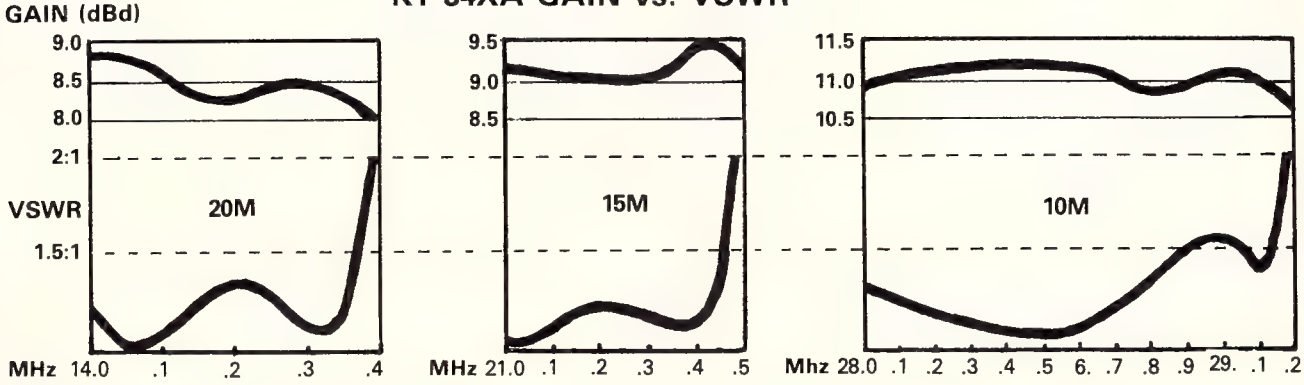

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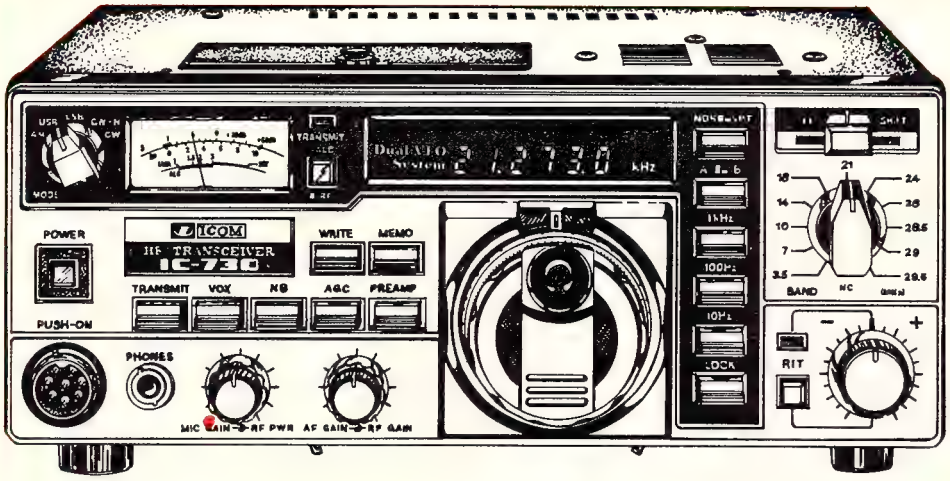

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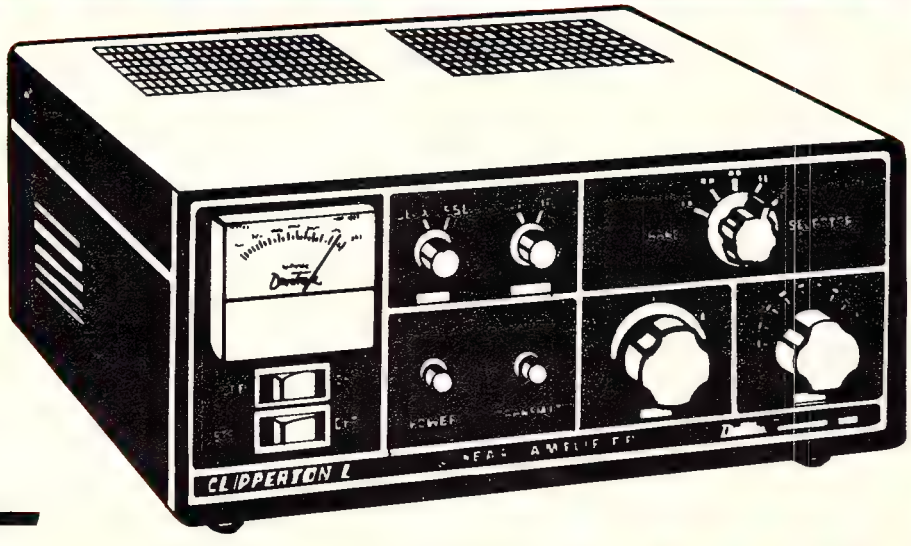

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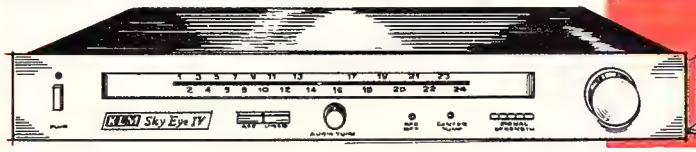

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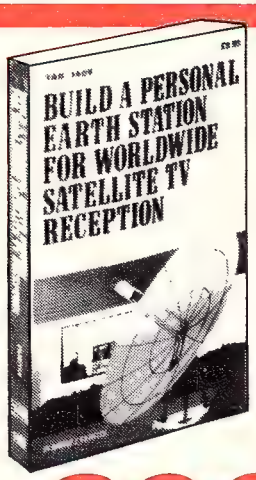

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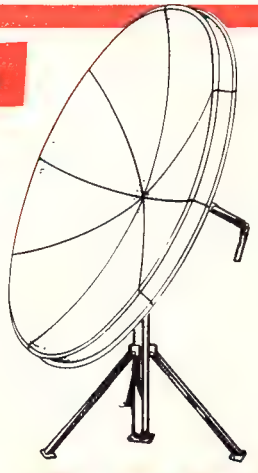

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owners are not inclined to up-date their systems as far as the feeds (coaxial lines to customers) are concerned. Coaxial lines and fittings disintegrate with the weather and are no longer r.f. tight. I know this only too well, because I am on a cable system and it is in very bad shape.

In addition, cable owners have been permitted by the FCC to add channels almost anywhere they want because cable is theoretically an r.f.-tight system. Some cable systems have added channels in our 2 meter band! This has caused havoc in many parts of the country because the systems are not well shielded. When you transmit on the channel frequency, you get into the cable system. Now you don't interfere with just one or two people, but rather scores of them. The answer to this problem is education of the cable owners in getting them to move the channel (this has been accomplished in several areas already). Some have shown responsibility and have moved the channels to a less-used part of the spectrum. In my area they were real smart. They moved one channel that was having problems—guess where. They moved right onto the local police frequency! So like I said, education is the problem here as it is with the general public concerning any form of TVI. And above all don't lose your cool! I can tell you stories of hams being shot at, beat up, homes burned, and on and on. I've been there. Handling TVI requires lots of tact and diplomacy. In fact, you are better off having a third (disinterested?) party do the negotiating.

Last But Not Least—Your Rig

The answer to your station being clean hasn't changed in years. It consists of a tightly shielded rig and a low-pass filter. A low-pass filter is simply the opposite of a high-pass filter. It is designed to pass any frequencies lower than its cut-off frequency and to attenuate any frequencies higher than cut-off, which is usually just above 10 meters. A good low-pass filter will provide about 70 dB of attenuation. How much is 70 dB? Well, with 1000 watts output, the harmonics could be no stronger than 0.0001 watt! That shouldn't cause any TVI. However, the rig must be tightly shielded and all leads filtered in order to achieve that much attenuation. Any nearby non-linear rectifiers will generate stronger harmonics than those coming from your rig. On 50 MHz there are filters for adjacent channel interference if Channel 2 is your problem. I won't guarantee anything on 6 meters, but it is worth a try.

In recent years I have seen very few newer commercial rigs that are adequately filtered and shielded and that would handle fringe area TVI. Sure, they put a shielded box around the final amplifier (sometimes), but this is worth practically nothing for weak-signal TVI. For a low-pass filter to work, it needs a tightly shielded rig, or the harmonics simply will flow around the filter to the antenna. Incidentally, although you may see it in other publications, the low-pass filter should be the last thing in the coax line to the antenna or just before a Transmatch, not right at the rig. Most of us use s.w.r. indicators, and nearly all of them contain diodes that can generate harmonics, so the filter should be in a position to stop them. Put the rig first, then the s.w.r. bridge, then the filter. Also, don't depend on Transmatches to help as far as TVI harmonics are concerned; they just won't cut the mustard on that score.

10 Watt TV Stations

Exactly what can you expect with a 10 watt station in your area? My guess is that most of the stations will be seeking channel space on Channels 2 through 6. Any of these channels pose a serious problem for us. In the early days of TVI we had problems with ignition interference from passing automobiles. Refrigerator butter keepers caused interference. Fish-tank thermostats were another problem. Oscillating hearing aids knocked out a picture. Anyone trying to receive TV near a hospital was in serious trouble from the various types of equipment used there. This was true of locations near some types of industrial plants or welding equipment. Neon lights caused bad problems. Always remember this: If there is any type of TVI occurring near you, the amateur, you are going to be blamed!

Why 10 watt stations when you probably have many channels available? Silver City, where I live, is a good example. Population about 12,000 with cable TV. We also have several translator stations. There are relatively low-powered stations transmitting the same programs as their parent station, as in our case Albuquerque (270 miles away) and El Paso (150 miles away). So why do we need another station when we already have about 20 or so available? Simple. And don't forget that it holds true for you. None of the stations we get carry local programming. I'll be honest. Frankly, I would enjoy watching our local football or basketball team. Lots of people would like to watch the rodeos, and we have many of them here. In other words, fellow amateurs, we have problems coming. A local station can make bucks with local programming. That's why there are some 6000-plus applications on file! It appears that we are going to have to toughen up our transmitter shielding and so on. I hope some of the Japanese and American manufacturers are reading this article!

What Disaster?

Like I said, Ted, a 10 watt TV station on Channel 2 in Silver City, New Mexico! I would like you to be my guest and help me clean up the problem when it occurs. I frankly think you and I will end up at the local bar watching the local football game and getting smashed!

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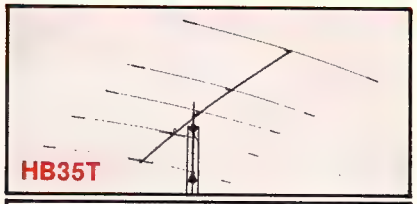

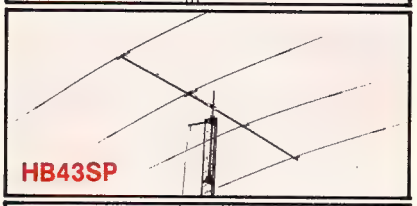

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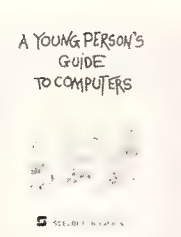

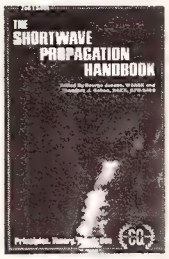

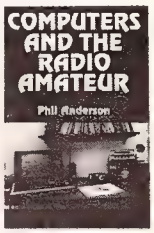

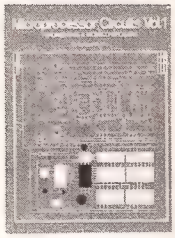

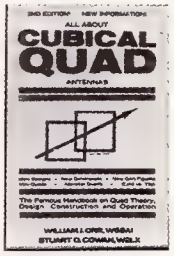

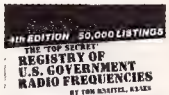

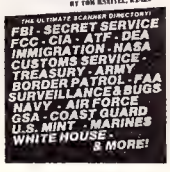

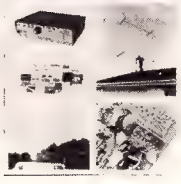

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A LOOK AT THE WORLD AROUND US

Future Video

It's quite exciting to consider future innovations in video from either the amateur or commercial standpoint, especially when you realize that these expansions are almost within our grasp at the present time. Interactive cable, or talkback TV, is a good example of this situation. Striving to regain some of the viewing interest lost to video tape and home satellite TV audiences, two-way cable systems could play a noteworthy role in video techniques of the next decade. Considering our existing video system, changes or upgrades are definitely past due.

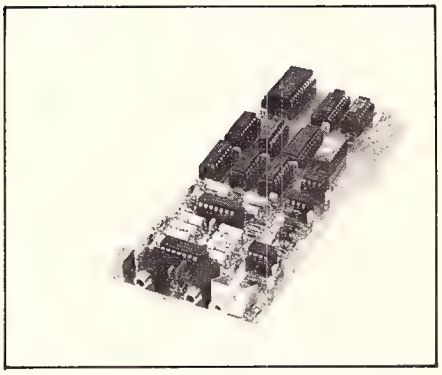
Commercial television employs the constant luminance, or color difference signal concept of transmission. Sparing specific technical details of this system, we will simply summarize by saying it provides a color display roughly equivalent to a child's form of painted picture. Large objects are reproduced in full color, medium-size objects (pixels) appear in only two colors (similar to old theater movies), and fine picture details are displayed only in black and white. This might be compared with modern theater movies in which full color rendition is reproduced independent of picture element size.

While such (TV) techniques may have been acceptable during the 1950's, changes are definitely in order for present times. Naturally, there is the old problem of incompatibility with existing systems, and that can create a stalemate situation. (Amateur systems are not confined in this manner; we can pioneer and upgrade with times and trends. S.s.b., SSTV, color SSTV, and ASCII are working examples of these advances.)

Now let's put some ideas into place and consider alternate techniques. Assuming holographic video began operating in the microwave spectrum (see May and September columns), primary public interest would shift into that range within a few year's time. Maintaining use of "old-fashioned" color television receivers, interactive color setups would then allow one to conduct numerous functions ranging from ordering groceries, paying bills, etc., to shopping for clothes in the stores of Paris or purchasing decorations from the private merchants of Japan, etc., via small television-attached terminals. Also included would be capabilities of viewing programs, plays, or public interest coverage from any corner of the globe—complete with language translations, etc. We see at this point the amateur rigging his own forms of holographic video, transport synthesizers, light repeaters, long-distance environmental scanners, laser probes, and unique video repeaters which might link with interactive cables. Such arrangements would permit semi-commercial capabilities from a handheld audio/visual transceiver. Cable TV setups themselves, being an off-the-air service, would eliminate the need for our presently existing v.h.f. and u.h.f. channels. Within a few year's time, a new form of truly full-color and high-resolution video could then be introduced for operation within that spectrum. This arrangement would not outmode interactive cables; indeed, those systems would continue providing long-term service to all subscribers.

Today's radio amateurs, we feel, are again pioneering the previously described concepts. Data communications and packet networks, combined with microwave links, etc., are setting trends which are destined to be followed for many years. Reflecting on the past, one can visualize how ATV repeaters might have afforded the original inspiration for interactive cable systems. Of course, radio amateurs have shown such capabilities for many years and surely will continue that trend during future times. Upcoming decades should prove an exciting era for both video and all radio amateurs!

The Commsoft Photocaster system in action. Apple II has 48K of memory and two disc drives. (See text for details.)



The Commsoft plug-in board for using the Apple II as an SSTV system. All required hardware is shown here.

Hard copy printout from MX80 printer used in conjunction with "Photocaster" and Apple II for SSTV display. Note quality and gray scale.

ISSS Status

The query in April's column concerning an International Slow Scan Society brought forth some (but not enough) interesting response. All except one individual favorably encouraged the Society's establishment, but few volunteered assistance for any future operations. Possibly the plan is still a few years premature. Considering the present-day trend of people working independently (doing their own thing) rather than in group ventures, there is a promising alternative for one area: help fellow amateurs according to abilities and expand when required. I'll explain. Several years ago, we learned of some isolated areas of the world lacking any form of visual link. Through a process and several month's time, we sent packages of items to associated amateurs in those areas until they eventually acquired their own "window to the world." (Have you ever seen a flyback and yoke

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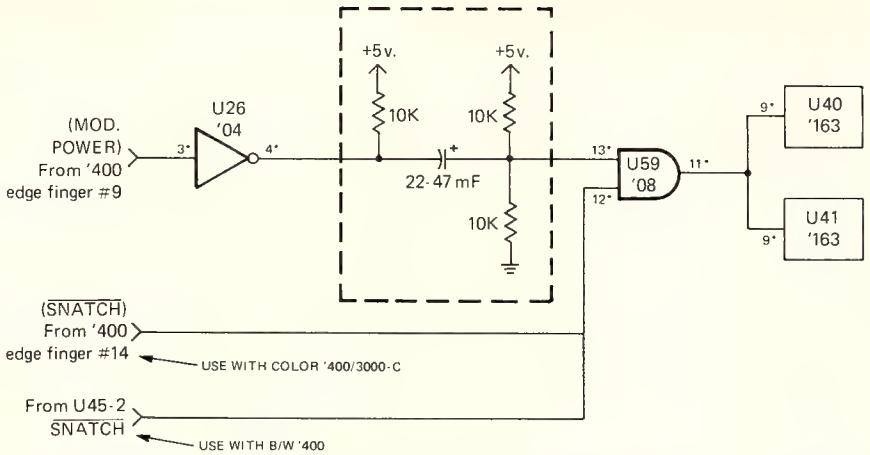

Fig. 1– Modification to '400 for transmitting the first SSTV frame in sync. This modification will reset the SSTV line counters U40 and U41 so that a vertical sync pulse is generated when switching to TRANSMIT MEMORY. Also, memory addressing is begun at the top of the SSTV picture. How to wire it: (1) The IC's indicated are on the '400 circuit board; (2) All pins marked with an asterisk (*) are to be lifted out and the connections shown are wired to these pins; (3) The parts in the dashed-line area are to be added as shown; (4) The 10K resistors can be ¼ watt; (5) The 5v. and ground buss' at top and bottom of the IC sockets of the '400 board can be used to connect the 10K resistors.

shipped as educational matter?) Our junk box may be depleted, but the parts are being put to good use. Remember our call several years ago in *Worldradio* for SSTV gear to equip Norfolk and Pitcairn? Amateurs like yourselves responded in a personalized and personally gratifying manner, providing first-time visual capabilities for those areas. Such "projects" surely carry even more gratification than home-brewing a station accessory, etc.

Visualize the isolated and sparsely populated areas of the world which could benefit from descriptions of progressive farming, contour irrigation, etc., while considering the rewards if each of us helped a remote country/amateur acquire a link with modern technology. The clouds of world famine are gathering; the time is nigh. If we can serve this need singularly, fine. If it calls for establishment of an international society, so be it. Bear in mind that this is not a call for every foreign amateur to cry "help," but if there is a need for assistance, we're confident that Slow Scanners can again provide such help. Meanwhile, SSTV developments will continue, and we'll all strive for its continued success . . . ISSS or not. Time will tell.

Apples and SSTV

A couple of months ago we briefly mentioned a new software/hardware package for Slow Scan operations with the Apple II computer, and promised more details later. This "Photocaster Package," available from Commsoft, 665 Maybell Avenue, Palo Alto, California 94306, is now going full swing, and its SSTV interest is growing quite rapidly. Essentially, Photocaster consists of a single pc board which plugs into the Apple II motherboard and an associated two-disc software package boasting some unique features. The system will run on an Apple II with 48K of memory and one disc drive. Black-and-white pictures are processed in the standard 128 by 128 pixels and 16 shades of gray, while subroutines remove noise, change contrast levels, add title/graphics, etc. Both transmit and receive capabilities are provided (similar to Robot 400 functions), and pictures can be stored on disc or directed to a popular Epson MX80 printer as desired.

Color SSTV operations are also included in the Photocaster package, but a certain amount of fine detail is sacrificed. Primary colors (blue, green, red/orange, and violet) are reproduced with a resolution of 140 by 192 pixels, while additional colors (yellow and cyan) and various in-

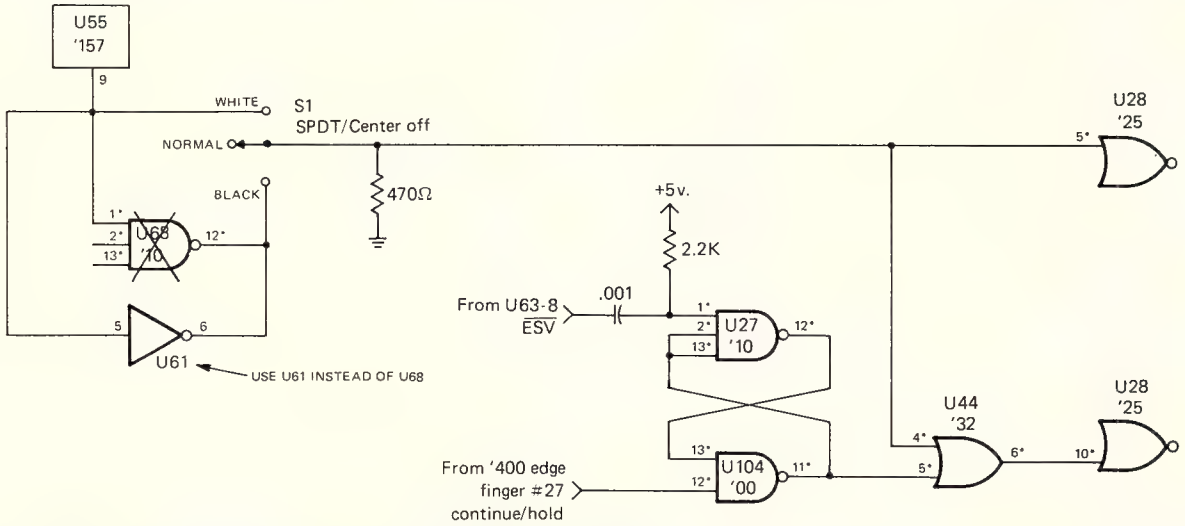

Fig. 2– Modification to '400/3000-C for superimposing camera/keyboard or received SSTV graphics. This mod will allow keyboard, computer, or camera graphics to be snatched and superimposed over existing pictures in memory. Also, incoming SSTV graphics may be overlayed on existing pictures. Lift out all IC pins marked with an asterisk (*). S1 is an SPDT switch with a CENTER OFF POSITION and can be mounted where convenient for operation. Wire the circuit per schematic. How to operate it: (1) S1 is set to the WHITE position if the graphics are white on a black background. S1 is set to the BLACK position if the graphics are black on a white background. The center position of S1 provides for normal operation with no overlay. (2) If a fast-scan graphics source is being used (i.e., computer, camera, etc.) set S1 to the proper position and snatch using the camera mode. (3) If a slow-scan graphics source is being used, set S1 to the proper postion and put the CONTINUE/HOLD switch in CONTINUE. The slow scan graphics will begin scanning when a vertical sync pulse is received. After the first scan is received, put the CONTINUE/HOLD switch to HOLD. (Note: The circuitry of U27, U104, and U44 only allows SSTV to be scanned when a vertical sync pulse is received and the CONTINUE/HOLD switch is in CONTINUE.)

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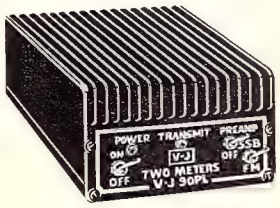

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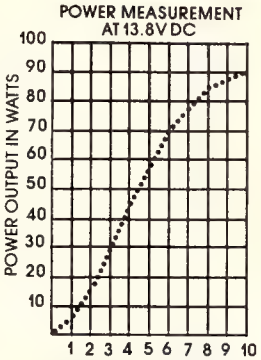

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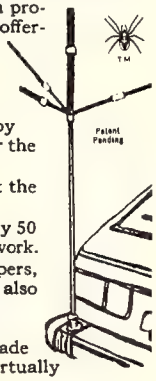

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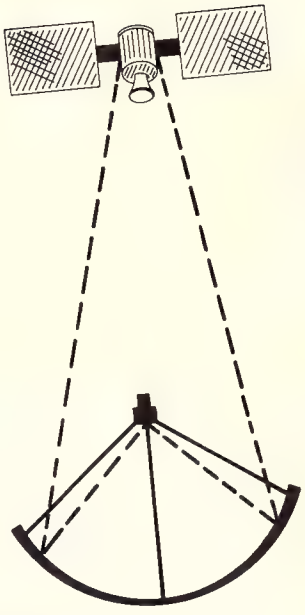

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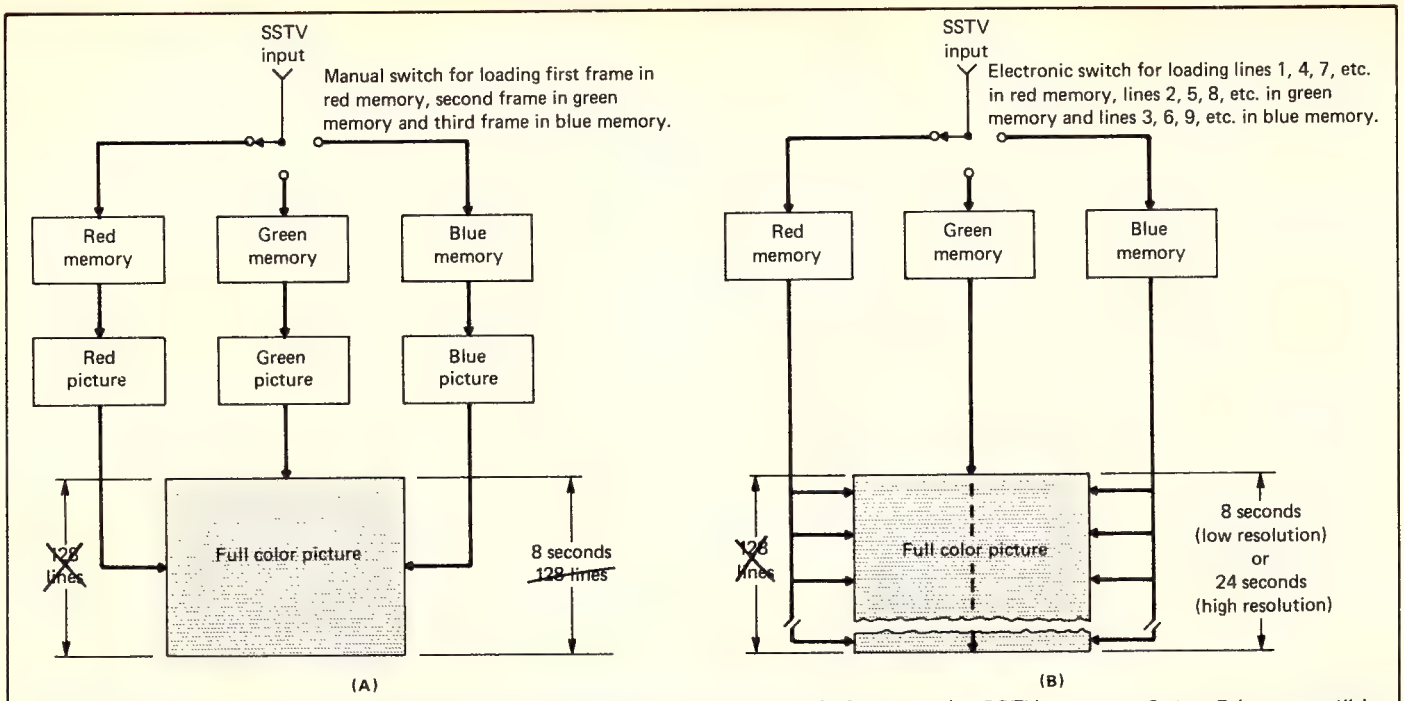

Fig. 3– Comparison of frame sequential (A) and line sequential (B), or single frame, color SSTV systems. Setup B is compatible with black-and-white units in 8 seconds, or it may be received in 24-second format provided 256 line mod is used and width control is set at maximum. Three horizontal pictures will then be displayed across screen, unless the "WA7MOV" mod is added (see text).

tensity levels are created by dot dithering. The final results are 8 colors and 16 levels of intensity. Two color formats are available with Photocaster: the popular R, G, B sequential frame method used daily on 20 meters, and an 8-second color method which can be used between two Apple II setups.

The complete Photocaster system is quite impressive. Quality for quality, it isn't quite equal to a commercial scan converter, but if one owns an Apple II (or if high-resolution SSTV color isn't an absolute prerequisite), the Photocaster package is an item that can't be overlooked.

Robot 400 Mods

We have a couple of very useful modifications for the Robot 400 in this month's column thanks to Howard McAfee, KD6HF, and Sam Mormino, WA7WOD. As you'll recall, these two gentlemen manufacture the "super mod" color SSTV systems which can be installed in a Robot 400. Howard may not always be on the air, but he's continually devising new goodies and ideas for Slow Scan TV. One of his more recent projects, for example, has been a 24-second line-sequential full-color modification for use with triple memory (color) equipped Robot 400's. This very simple mod loads (or unloads) the three memories on a line-by-line basis rather than on a frame-by-frame basis. The mod can also be added to single memory (black and white) Robots for compatible viewing of 25-second color pictures in black-and-white form. Alternately, one can use the now-popular 256-line mod to view 3 horizontal pictures during the previously mentioned 25-second transmissions (a nice advantage for checking color balance, also).

Line-sequential color SSTV is looking quite interesting at this time. It holds promise of close compatibility with black-and-white systems and should blend smoothly with computer-based converters (see fig. 3). In fact, Dr. Suding, WØLMD, has been transmitting both 8-second and 25-second line-sequential color from his computer, and we suspect Clay, K6AEP, may rig similar software for the TRS-80C color system. The close compatibility of this system for both analog and digital converters is quite encouraging. As one may logically surmise, 8-second line-sequential color has less resolution than 25-second line-sequential color. More details later.

A Closing Thought

That wraps up the happenings in this month's World of Video, gang, so we'll wish you a merry time and watch for your signals on 14,230 kHz. If you're an onlooker or newcomer to SSTV, I would like to encourage you not to become distracted or disillusioned by the experimental/developmental areas within Slow Scan (such as computer interfacing, color SSTV, etc.). Rest assured that the vast majority of active Slow Scanners are still involved in "good old video operations," and we all remember starting "from scratch" not too many years ago. Not only is there a substantial amount of relaxing enjoyment awaiting every amateur video enthusiast, but there is also equipment and modifications readily available to the increasing number of operators barely able to find a few minutes a day merely to get on the air and enjoy the exciting world of amateur radio. What else can we say except come on in; the viewing's great!

73, Dave, K4TWJ

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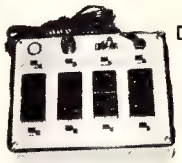

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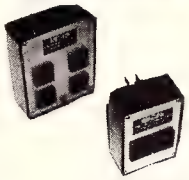

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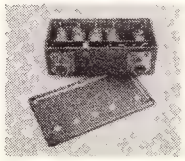

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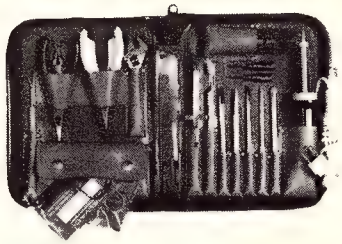

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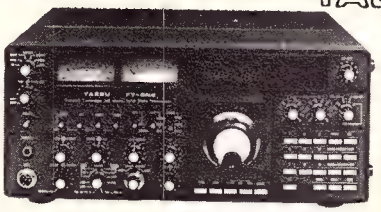

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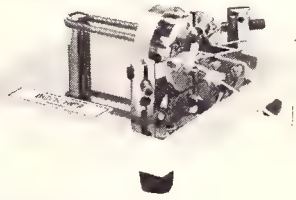

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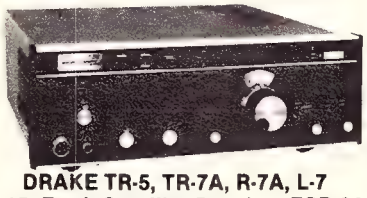

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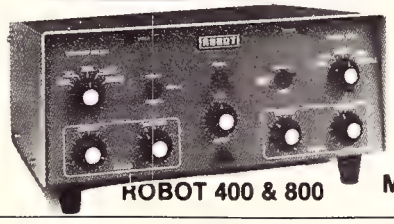

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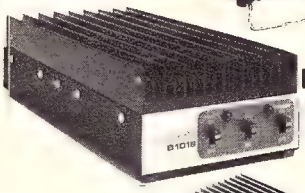

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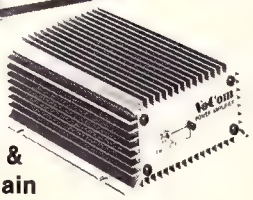

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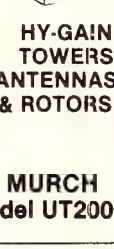

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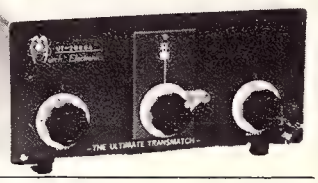

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Antenna Accessories for the Hamshack: Part I

It takes a lot more than just the antenna and transmitter to radiate a respectable signal; many components and accessories contribute to overall "signal success." In this series of articles, our columnist W8FX takes a look at them. Read on for the facts on checking out your station's r.f. performance.

There is a certain mystique about antennas that makes them fun to experiment with; indeed, successful antenna performance is both an art and a science. But there is more involved in such success than just the antenna. Certain accessory equipment is useful (and often necessary) for experimenting and solving antenna problems, but just how many antenna gadgets are needed to put out a good signal, and how does one use them?

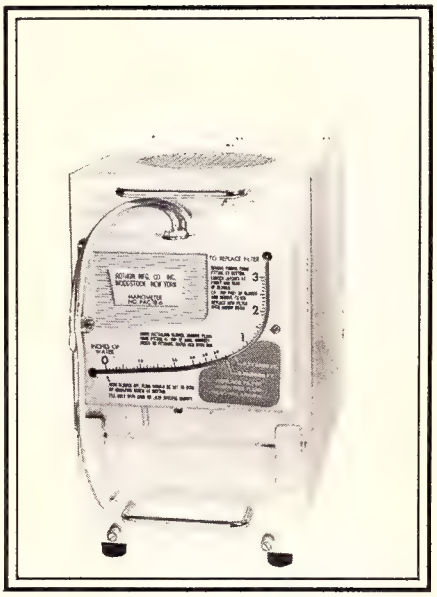
In this series we will examine r.f. antenna accessories and specialized test equipment. First to be covered will be *inline* devices. These include dummy loads, wattmeters and r.f. ammeters, s.w.r. bridges, r.f. switching and lightning protective devices, baluns, r.f. transformers and transmatches, and r.f.i. filters.

Next to be covered will be the *peripheral* devices—those not directly in the path of r.f. from transmitter to antenna. These include field strength meters, antenna noise bridges, and grid-dip meters or oscillators. Finally, we will look at other types of r.f. test equipment, and have some words to say about maintenance and test equipment costs.

All this will take several months, so we'll begin with a look at the first category of accessories mentioned above, starting with the dummy load.

The Dummy Load

Let's talk about just what a dummy load is. It is simply a device that substitutes for an actual antenna. It has the power-handling capability to absorb the full output of the transmitter or transceiver under test. A properly constructed dummy load has the same resistance or impedance as the antenna it temporarily replaces, so the transmitter can be tuned up and adjustments can be made as though on the air. The dummy load, of course, should not radiate a signal, but instead should "simulate" the effect of the antenna.



Very heavy-duty Rotron air-cooled dummy load is offered by Wawasee Electronics. The 50-ohm load operates over a range of 1.6 to 240 MHz, for an s.w.r. of 1.2:1. Although only rates at 200 watts RMS without blower in operation, the unit with blower running is rated at 4000 watts continuous p.e.p., or 2000 watts RMS. (Photo courtesy Wawasee Electronics)

The dummy load is so important that it's fair to say that you shouldn't put a signal on the air unless you possess one. When you first acquire your equipment, you should load it into a dummy load to familiarize yourself with your rig's operation, and to establish a sort of standard of performance for your gear, making note of transmitter dial settings and meter readings for future reference. Bear in mind that when servicing your gear you will need to use a dummy load for two reasons: first, so as not to unnecessarily clog the airwaves with test transmissions; and second, because practically all service procedures require that the equipment be connected to a dummy load for proper operation under test.

What constitutes a good dummy load? First and foremost, it should present a steady, purely resistive load to the transmitter, usually 50 or 75 ohms, at all power levels over the entire frequency range of the transmitter with which it will be used. It should be shielded to prevent unnecessary radiation and possibly TVI. It should also be capable of handling the full power output of your equipment without overheating, and it should be connected to your rig by a short length of coaxial cable—preferably through a coax switch so that it can be switched in and out for tune-up and testing.

There are several types of commercial dummy loads that you can buy, or you can make one yourself. Most commercial units consist of either a heavy-duty air-cooled resistor capable of absorbing your transmitter's output, or a hefty resistor encased in a "paint can" full of non-conducting, high-temperature transformer oil (for heat dissipation). Some dummy loads also have a built-in d.c. sampling circuit so that you can get an indication of relative power output by connecting a d.c. voltmeter to it. A number of manufacturers offer r.f. power meters that terminate in a dummy load; they're handy instruments indeed. Heath, Bird, MFJ, Dentron, Barker & Williamson, and others all make a variety of highly useful and worthwhile units which you may want to consider purchasing. You'll find that the dummy load will not soon become obsolete, provided you acquire one that has adequate power-handling capacity for future station growth.

Let's stress again that the dummy load should present something close to a 50- or 70-ohm impedance and that it should not exhibit reactance—i.e., it should be a "pure" resistance. True, there must be some kind of conductor that connects the transmission line to the power resistor. At the lower h.f. frequencies, lead length isn't terribly important. But as we go to higher h.f. frequencies and to the v.h.f./u.h.f. ranges, the leads tend to act like inductors and capacitors. As a result, a dummy load that takes on the characteristics of a pure resistance at 80 meters may appear like a resistor in series with an inductor or capacitor on 6 or 2 meters; such effects become more marked as frequency is increased. Obviously, great care must be taken in the construction of homebrew units for v.h.f. and u.h.f. use.

In view of these considerations, what about using the common household lamp as a "cheap and dirty" dummy load? The fact is that the ordinary light bulb isn't a bad absorber of r.f. energy. There is no reason why you can't use the bulbs as "passable" dummy loads, at least at moderate power levels up to and includ-

*317 Poplar Drive, Millbrook, AL 36054

The dummy load is a virtually indispensable piece of r.f. test equipment in the shack; it allows you to make precise equipment adjustments over a prolonged period without generating unnecessary interference. Popular h.f./v.h.f. high-power unit by K4RLJ is shown here. Device is a sealed unit based on a non-corrosive chemical load. Previously marketed by SST, the small load is now distributed by Van Gorden Engineering.

ing 10 meters. Of course, the common light bulb has so many disadvantages as a dummy load that the "pro" wouldn't dream of pumping the output of his expensive world-class transceiver into it. But for casual check-out of a small QRP rig, it's hard to beat for convenience, simplicity, and low cost.

Don't try using the bulbs at high power levels or at v.h.f. They won't give a good account of themselves and may cause your equipment to be damaged. Recognize that as they heat up, they change impedance wildly. They also radiate excessively, particularly at the higher frequencies, and they can even change impedance while in use, making the load seen by your rig highly erratic. However, they do have the advantage that you can "guesstimate" your transmitter's output by visually comparing the bulb's brilliance with that of an identical one connected to the a.c. line. If you want to experiment with a light-bulb load, go ahead. Don't let this discussion put you down. For starters, try a bulb rated at about 70 to 85% of your transmitter's rated input power.

One caution: Be sure to shield your bulb. If it's unshielded, don't be surprised if others hear your test transmissions! Many hams, to their utter amazement, have "worked" hundreds of miles—unintentionally—on their breadboard light-bulb loads!

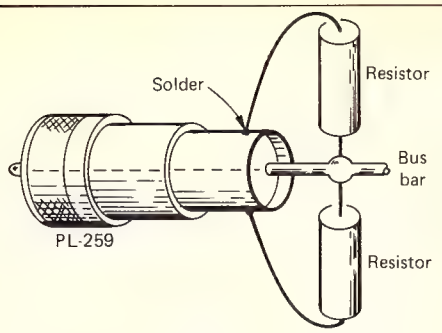
What about rolling your own dummy load? Frankly, if you're running high power, it's a sound idea to purchase one of the commercial units. Most contemporary units are full-power wide-range loads; they can handle any legal amateur power level up to several hundred MHz. You can hardly duplicate them yourself at reasonable price levels. However, if you're running lower power, say up to about 100 watts or thereabouts, it makes sense to construct your own, since doing so entails a very simple project which can be accomplished for a few dollars. Let's talk about two simple loads which you can construct for your shack.

For working with very low power levels, such as the output of a mobile or hand-held v.h.f. transceiver, you can use a dummy load such as that shown in fig. 1. It should be useful in testing and adjusting the "typical" 10-watt class of v.h.f. transceiver. It is made up of two 100-ohm or 150-ohm, 2-watt resistors, depending on the load impedance you desire (50 or 75 ohms). I suggest mounting them, as shown in the illustration, to a PL-259 connector, regardless of the type of connector used on your rig. You can make or purchase an adapter connector to mate the PL-259 to other connectors which you may encounter on different makes and types of transceivers, such as BNC, Type F, RCA phono jacks, and Motorola automobile-radio-type fittings.

Another simple 75-watt load is shown in fig. 2. It is easily constructed, inexpensive, and can even handle 100-watt transmitters for periods long enough to make necessary adjustments and take power output readings. Its impedance is about 50 ohms, which is just right to match the output impedance of almost all pi-network transmitters (they are normally designed to work into load impedances ranging from about 30 to 100 ohms).

Construction is simple. The whole affair can be mounted in a small aluminum box, roughly 5″×3″×2″. No special techniques are required. Just mount a standard SO-239 chassis-type coaxial connector to the minibox and neatly group the twenty-two (22) 270-ohm resistors around it in two bands of 11 resistors each. The two bands are connected in series-parallel as shown in the diagram to result in an "equivalent resistance" of approximately 50 ohms (49 to be exact!). This can be done in any number of ways, and so, no special physical arrangement of the resistors need be followed. Just make sure that they are mounted neatly, that their bodies don't touch one another (for heat dissipation), and that all connecting leads are as short as possible. I recommend drilling a number of ventilating holes (at least 10 on each side of the cabinet) to allow the heat generated by the resistors to dissipate. The unit is connected to the transmitter by a short length of 50- to 53-ohm coax.

Note that the r.f. ammeter indicated in the diagram isn't absolutely necessary, and it may be eliminated if you so desire. But it's handy because it allows you to measure your transmitter's output using



For QRP transmitters and v.h.f. transceivers, a dummy load can be made for a dollar or two using nothing more than two carbon resistors and a PL-259 connector, as shown. It is made by soldering a piece of heavy copper wire or bus bar to the center post of a coax connector and installing two resistors between the bus bar and the connector's shell. For 70- to 75-ohm match, use two 150-ohm, 2-watt resistors in parallel; if what you prefer is a 50-ohm load, use two 100-ohm resistors. Be sure to use carbon and not wire-wound resistors; the latter will not work properly.

For tune-up, you can use your rig's internal metering, or you can use the r.f. probe of a v.t.v.m. clipped across the dummy load, tuning your gear for maximum meter deflection.

If you keep leads short, the dummy load shown here will work properly up to 2 meters, and will easily handle the output of 10-watt v.h.f. transceivers if used intermittently.

You can also make a medium-power dummy load for an h.f. transmitter using various combinations of resistors connected in series-parallel arrangements. One such load is shown in fig. 2.

Fig. 1– Inexpensive low-power dummy load.

a simple Ohm's Law calculation: power (in watts) is equal to current (in amperes) squared, and multiplied by resistance (in ohms). This is more clearly written using the equation P (power) = I^2R. We'll turn next to the use of r.f. ammeters in the hamshack.

The R.F. Ammeter

A very basic piece of antenna test equipment is the r.f. ammeter. While most hams would agree that the most basic instrument is now the s.w.r. bridge, 20 to 25 years ago most amateurs relied almost completely on the ammeter as a yardstick of antenna matching, loading, tuning, and for power determination.

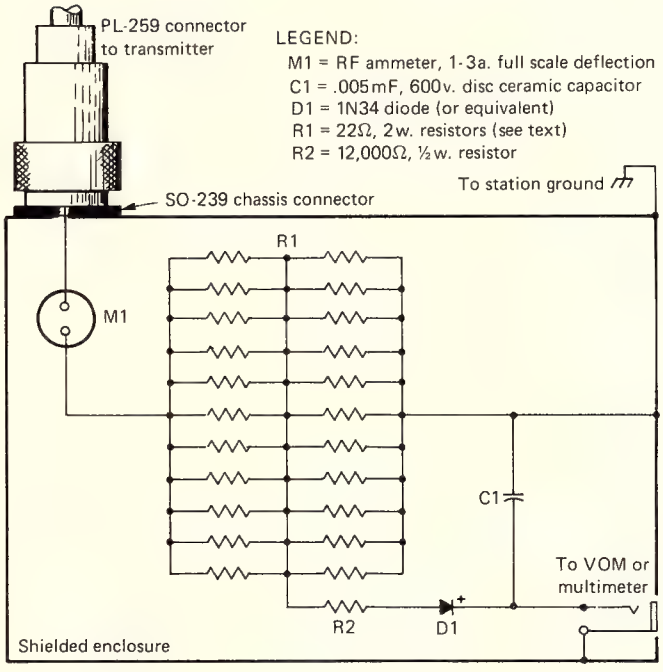
The r.f. ammeter is a device that indicates the radio-frequency current (in amperes) in an antenna circuit. Most are actually *thermocouples* used in conjunction with an ordinary d.c. meter. In operation, the thermocouple is heated by a resistance wire through which the r.f. current flows, causing a d.c. current to be generated, which in turn drives the meter. This allows the meter to indirectly indicate the amount of r.f. flowing through the circuit.

While the s.w.r. bridge is getting the play today, the r.f. ammeter is still very useful in tuning up antennas and in making power measurements. For example, if you're using parallel-conductor transmission line, such as open-wire line or twinlead, to feed a multiband antenna, the ammeter may be used in trimming or balancing the legs of the antenna for proper length. This is often required since nearby objects can unbalance the antenna so that even if it is resonant, it may not be electrically symmetrical. In doing this, *two* r.f. ammeters are usually used, one in each side of the feedline. Each leg of the antenna is cut (pruned) until the currents are approximately equal. This setup can also be used in conjunction with an s.w.r. bridge, which is inserted in the line between transmitter or transceiver and antenna coupler or balun. The antenna coupler's adjustments are made for lowest indicated s.w.r., while the antenna itself is pruned for maximum (or equal) currents in the two legs of the transmission line, as indicated by the r.f. ammeters.

You may find other uses for the r.f. ammeter. For instance, it's possible to determine how *much* power is lost in the coaxial transmission line linking transmitter with antenna. This is done first by taking an r.f. current reading with the dummy load connected directly to the transmitter's output connector, then taking another reading at the far end of the transmission line with the dummy load connected at that point. The difference in the two readings represents the power lost in the transmission line.

Getting down to a more common situation, say you build and use the 50-ohm load described in fig. 2. If you read a current of 1 ampere flowing through your ammeter, plugging into the formula shows output power to be 50 watts, about right for a 75- or 80-watt transmitter. The size or rating of the r.f. ammeter you use isn't critical. In general, though, a 1-ampere meter should be okay for up to 75-watt (input) transmitters, while a 2- or 3-amp meter will handle more power than the dummy load we've built here can take. If you don't want to invest in an r.f. ammeter, there is also a provision in the load shown here for connecting a d.c. milliammeter (such as in your multimeter or v.o.m.) to the output jack for relative power output monitoring.

For maximum versatility, however, you'll probably want to use the dummy load in conjunction with an s.w.r. bridge/power meter for an indication of forward and reverse power. Since most power meters are designed to work into a known, predetermined load impedance,



The 50-ohm dummy load shown here can be used with transmitters of up to about 100 watts input to at least 30 MHz. An r.f. ammeter is connected in the line to allow you to calculate your transmitter's power *output* using the Ohm's Law relationship P = I^2R.

The combined resistance of the twenty-two (22), 270-ohm resistors works out to be 49 ohms, which makes a good impedance match for the "nominal" 50–52 ohm output of most modern transmitters. Since resistors combined in series are additive, while resistors in parallel are divisive, you can easily make up other values for your load if you wish. For example, you can adapt this load for 70–75 ohm use by instead using twenty-two 390-ohm resistors. Many other combinations can be worked out for other load values and for handling either higher or lower power levels.

No special procedures are necessary for construction other than keeping leads short and doing a good soldering job. An r.f. ammeter having a full-scale deflection of 1 to 3 amperes should fill the bill—and it can be eliminated if you have your own s.w.r./power meter or don't care to make current or power measurements. Or, you can connect your multimeter or v.o.m. to the output jack to measure *relative* power output.

The unit can be mounted in any convenient-size ventilated metal enclosure and connected to the transmitter through a short length of coaxial cable. After you finish construction, be sure to check the resistance of the completed dummy load for shorts (as read on an ohmmeter connected between the center pin on the input connector and the enclosure) *before* applying power. It should read about 50 ohms, or around 71 ohms if you designed the load for that impedance.

Fig. 2– A 100-watt dummy load (75-watt nominal).

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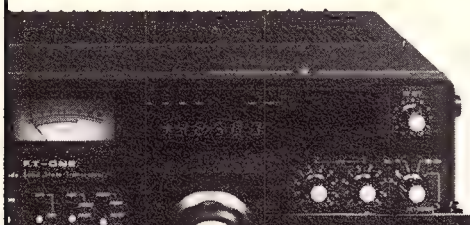

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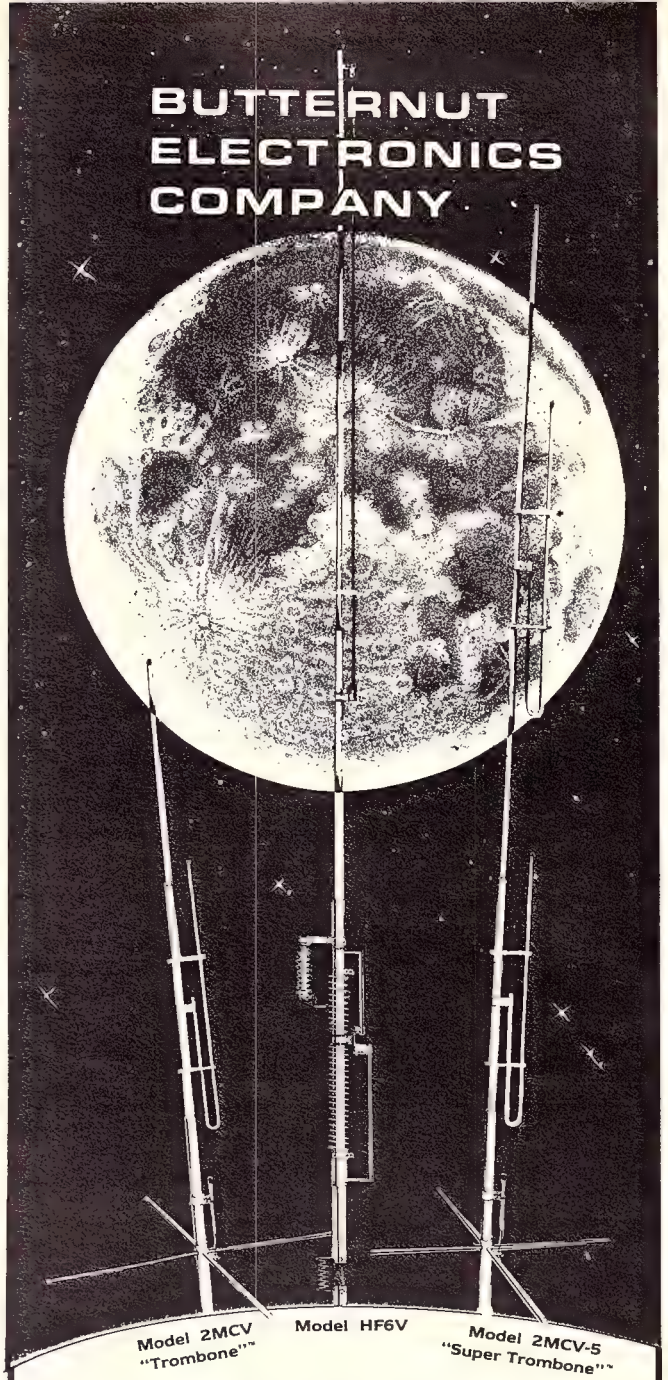

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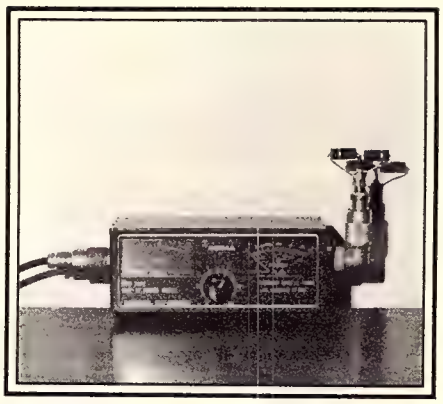

A homemade low-power v.h.f dummy load is shown mounted to the side of a Sigma RF-2000 s.w.r. bridge/wattmeter. The dummy load shown in the photo differs slightly from that described in the text. In this one, it is mounted on an RCA-type phono plug which in turn slips into an RCA-to-coax connector adapter. In this way, the little dummy load can be used with transceivers having either RCA or standard coax fittings. Based on the author's article "Dummy Up for DX," which appeared in August 1978 CQ.

using the dummy loads described here will enable you to get a very accurate picture of your transmitter's output. You can check on the accuracy of your dummy load by switching to the reflected power function on your power meter or s.w.r. bridge; it normally will read below about 1.2 to 1.

Of course, after completing testing and tune-up with the dummy load, it's important to ensure that maximum power is being transferred to the antenna; it's the r.f. that jumps off your antenna that counts. This means that you should have a good impedance match between the transmission line and the antenna. A grid-dip meter or antenna noise bridge will help you to obtain a good match to the antenna, and an s.w.r. bridge left in the transmission line will allow you to keep a "running check" on your overall s.w.r. We will get to these instruments, but for the moment we'll focus on the major in-line devices. Next month, we'll continue with a discussion of wattmeters and s.w.r. bridges. See you then.

73, Karl, W8FX

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Awards

a monthly feature by
A. EDWARD HOPPER, W2GT

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month as told by Clay:

Clayton N. Schlenker, W4XT All Counties #325, 5-8-81

"It seems like a long time ago (over 10 years) when I happened to have a QSO with John, W0QWS. I was so surprised when John called me by name! It turned out that John and I had QSO'd one time, many years before, and you know how County Hunters are—they make out a card and keep a record of everything! Anyway, John told me he was a County Hunter. I had just finished 5BWAS (#97) a short time before and was looking for another challenge. Thanks to John, who sent me a P.O. Directory, I was on my way.

"A special thanks to W6CCM, Dave and Barbara, for taking such good care of my cards. My records indicate that my return was at least 99.999%, which is exceptionally good! A special thanks to all those mobiles who made it possible, and those who went a little out of the way to get that last one.

"To my good friend Arnie, K9DCJ, and his good XYL who puts up with us, a special thanks for that last County, Dubuque, Iowa. Arnie drove down from Wisconsin on Sunday, 3 May 1981, and what an exciting experience that turned out to be. Just prior to our contact I heard Arnie working the county with a 5×7 signal. However, when I broke the Net to work Arnie, who was waiting on the County line of Dubuque and Jackson, it took me three tries to get my 5×7 report. Afterwards, I accused Arnie of turning down his audio gain to make it more exciting! At Arnie's suggestion I made a recording of that QSO and I greatly enjoy listening to it. I would recommend that others record their last County QSO.

"Thanks to you, Ed, and *CQ* magazine for the important part you play for all of us. I haven't decided whether or not I will do it again, but regardless, I'll be on to give out good old #325."

Clayton N. Schlenker, W4XT, and his neat, well-equipped radio room.

Johanna, 2½ years old, second Op. at SM0BZH.

DK4SY, USA-CA-500, #2 to DK4.

Awards Issued

Ken Wosika, KB7QO, added to his fine collection USA-CA-2500, 3000, and All Counties endorsed All 14, All Phone, All Mobiles.

Jim Emerson, WB6GMM, added USA-CA-2500, 3000, and All Counties to his fine collection, endorsed All S.S.B., All 14, All Mobiles.

Dean Cowden, KK0V (ex-W0CJG), qualified for USA-CA-3000 and All Counties endorsed Mixed to complete his collection.

Rick Harris, AI5P (ex-WA5VKJ, WB5YEF, W5-10353), who got USA-CA-500 in January 1978, came through with his paperwork to finish USA-CA-1000 through All Counties endorsed Mixed.

Clyde Jones, WA3HMJ, waited until he had them All and collected USA-CA-500 through All Counties endorsed All S.S.B.

Willis Gordon, K5WQM, also waited until he had them All to get USA-CA-500 through All Counties endorsed Mixed.

John Sebastian, N8BGF, keeps plugging away and claimed USA-CA-3000 endorsed All S.S.B., All Mobiles, All 20.

"Red" Robert, W5VGF, had me send him USA-CA-2000 endorsed All A-1.

Bud Lafferty, W0UBT, wrote for USA-CA-500, 1000, and 1500 endorsed Mixed.

Bill Hudzik, WA2UDT, acquired USA-CA-1500 endorsed Mixed.

Les Flake, K8KIR, won USA-CA-1000 and 1500 endorsed All A-1.

The United Nations Amateur Radio Club, 4U1UN, picked up USA-CA-500, 1000, and 1500 endorsed Mixed.

Don Colzze, WB2MZI, gained USA-CA-500 and 1000 endorsed All S.S.B., All 20.

Jon Fogdall, N0AGW (MARAC Secretary), was issued USA-CA-500 and 1000 endorsed All S.S.B., All 14, All Mobiles.

USA-CA-500 Certificates, endorsed Mixed, go to:

Seppo Lilja, SM0BZH (ex-SM4BZH, SM5BZH, SM6BZH, and SM4BZH/MM).
Leon Bishop, KV5F.
Adolf Keppler, DK4SY (#2 to DK4).
Mike Lowe, G4KHB.
Mary Ann Crider, WA3HUP.
Davor Milosevic, YU2TS (#7 to YU).

USA-CA-500 Certificates, endorsed ALL CW, sent to:

Akira Inage, JA5MG (#1 to JA5).
Tadashi Kondo, JA7ARM.
John Aakre, LA5SH.

USA-CA-500 Certificates, endorsed All S.S.B., requested by:

Jacques Davy, FM7AV (F5JY), #1 to FM7.
Elicio Munoz L., XE1OX, #5 to Mexico.
Dr. Michael Friedrich, DJ5TH.
Yasu-Tada Ninomiya, JH8GWW, also endorsed All 10 meters.

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Special Honor Roll
All Counties

#384 Kenneth J. Wosika, KB7QO 6-7-82.
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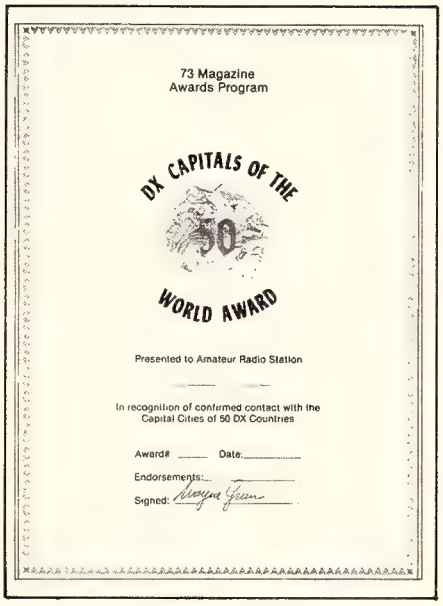
#386 Dean Cowden, KKØV 6-12-82.
#387 Richard H. Harris, AI5P 6-18-82.
#388 Clyde E. Jones, WA3HMJ 6-21-82.
#389 William F. Gordon, K5WQM 7-6-82.



DX Capitals of the World Award.

Awards

DX Capitals of the World Award. Sponsored by the editors of *73 Magazine,* this award is available to licensed amateurs the world over. To be valid, all claimed contacts must be made on or after January 1, 1979. There are no band or mode restrictions, but special recognition will be given for single band or mode accomplishments if requested in the application. To qualify, applicants must work and confirm fifty (50) different capital cities of the world. Only capitals of those countries which appear on the WTW DX Listing qualify. Should a country be contacted and its capital city not commonly known, you may list it on your application and the awards editor reserves the right to make a final determination as to its acceptance for award credit.

To apply, make a list of contacts made in prefix order. Indicate the station call sign, date, and time in GMT, band and mode of operation, the name of the capital city, and the DX country. Do not send QSL cards! Have your list of contacts verified by two amateurs, a radio club secretary, or a notary public. The award fee is $4.00, or 12 IRCs. For all *73* award applications, enclose your verified list and fee to: Bill Gosney, KE7C, *73* Awards Editor, 2665 North Busby Road, Oak Harbor, Whidbey Island, WA 98277 U.S.A.

Ten-Meter DX Decade Award.

Ten-Meter DX Decade Award. Sponsored by the editors of *73 Magazine,* this award is available to licensed amateurs worldwide. All contacts must be made on the 10 meter band using only channelized converted Citizen Band equipment or similar-type commercial units operating a maximum of 15 watts p.e.p. output. External amplifiers may not be used. To be eligible for this award, all contacts must be made on or after October 1, 1978. Contacts may be claimed for all AM, SSB, CW or FM. Mixed-mode accomplishments are not valid for this award. To qualify, the applicant must work and confirm at least 10 DX countries from the WTW (Work the World) Listing. Endorsements will be given for 25, 50, 75, and 100 countries confirmed.

To apply, make a list of contacts claimed, giving the call sign of each station worked in prefix order. Include the date and time in GMT, band, mode, and a brief description of the equipment used in making each contact. Special recognition will be given for QRP mobile achievements. Do not send QSL cards. Have your list of contacts verified by two amateurs, a local radio club secretary, or a notary public. The award fee is $4.00, or 12 IRCs. Apply to: Bill Gosney, KE7C.

Work the World DX Award.

Work the World DX Award. To enhance the enjoyment of working DX, the editors of *73 Magazine* take pleasure in introducing the most complex and probably the most sought after award. The WTW Award is available to licensed amateurs the world over. All contacts must be made on or after January 1, 1979. There are no band or mode restrictions, but applicants will be given recognition for single-band or mode achievements upon their request. Only DX countries shown on the WTW DX List qualify. The WTW program consists of six continental awards (North America, South America, Europe, Oceanic, Asia, and Africa), each of which is a worthy accomplishment on its own. Once application has been made for all six, the ultimate award, the WTW DX Award, will be issued automatically without charge. Requirements for the individual Continental awards are: North American Award, work 13 North American countries; South American Award, work 12 South American countries; European Award, work 12 European countries; Oceanic Award, work 12 Oceanic countries; Asian Award, work 12 Asian countries; African Award, work 12 African countries. To apply for any of these six awards, prepare a list of claimed contacts for each continent, listing all call signs in prefix order. Include date and time in GMT, and the band and mode of operation. If you are submitting the sixth award application, please emphasize this fact to speed processing of your WTW Award. Do not send QSL cards! Have your list(s) verified by two amateurs, a radio club secretary, or a notary public. Each Continental Award has an award fee of $4.00, or 12 IRCs. Apply to Bill Gosney, KE7C.

Work Asia Award.

The Hungarian Radioamateur Society. They have a fine awards program, issuing some 11 different awards. For full information, send s.a.s.e. and a few IRCs to: The Hungarian Radioamateur Society, P.O. Box 11, Budapest, H-1400, Hungary.

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K5WQM	418	K5WQM	595	KV5F	1736
2500				DK4SY	1737
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WB6GMM	472	1000		FM7AV	1739
AI5P	473	WØUBT	722	XE1OX	1740
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2000		AI5P	725	WA3HUP	1743
		WA3HMJ	726	4U1UN	1744
AI5P	525	K8KIR	727	YU2TS	1745
WA3HMJ	526	4U1UN	728	JH8GWW	1746
W5VGF	527	K5WQM	729	K5WQM	1747
K5WQM	528			LA5SH	1748

Worked All Iowa Counties with NØCKN or NØCOL.

Worked All Iowa Counties. Issued in two classes to all amateurs for contacts with NØCKN, Jerry Pollard, or with NØCOL, YL, Gwen Tolsdorf, in all 99 Iowa Counties. C.w. and s.s.b. endorsements available. Look for NØCKN and NØCOL regularly on 14336 with c.w. contacts made on 14070 on request. QSLs not required; just send log extract with county, date, UTC, RS/RST. No partial lists, please. No fee. Contact NØCKN/NØCOL, P.O. Box 3121, Des Moines, Iowa 50316.

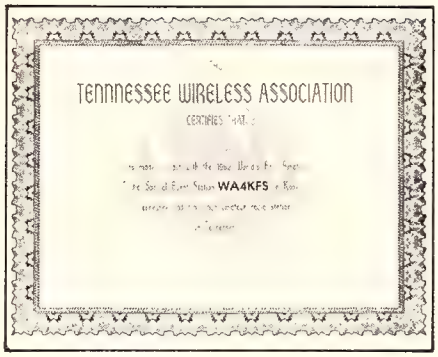
The Diplom Interessen Gruppe (DIG). They also have a very fine awards program. For full details, send s.a.e. and several IRCs to DJ8OT, Eberhard Warnecke, Postfach 101244, D-5620 Velbert 1, West Germany.

The Six Meter International Radio Klub (SMIRK). They have a fine 6 meter awards program with some 6 different awards. Send an s.a.s.e. to Jeffrey K. White, WD8OXK, P.O. Box 767, Athens, Ohio 45701 for full details.

The Central States VHF Society. They have three new colorful awards for the v.h.f./u.h.f./s.h.f. bands. For full information, send a legal-size s.a.s.e. (with two stamps on it) to Bob Taylor, WB5LBT, 10715 Waverland, Baton Rouge, Louisiana 70815. *(Thanks to WA1JXN for this data.)*

Belgian DPN Award.

The Diplome du Pays Noir (DPN). This award is issued by the radio amateurs of the Charleroi area associated with the UBA (Belgian Society of the IARU). The Belgian area is called the "Black Country" because the principal activity is coal mining and steel works. About 100 amateurs are active in this area. The award is available to amateurs and s.w.l.'s—for those outside Belgium and on the h.f. bands you need to contact 5 stations in the "Black Country" area. Contacts from January 1, 1982 are valid, any band, any mode. Send list of the contacts (call, date, time, frequency) and three IRCs to Philippe O. Dumont, ON5IP, 489, route de Beaumont, B-6030 Marchienne-Au-Pont, Belgium.



Worked the World's Fair Certificate.

Worked the World's Fair Certificate. The Tennessee Wireless Association, sponsor of WA4KFS, offers this certificate under the following rules: Work the World's Fair Station, WA4KFS. Submit a GCR list of confirmed contacts with ten other Tennessee stations. There is no limit as to band, mode, or date. Include a check for $2.00 processing fee to Sarah Hickey, N4EFA, 10712 Mercury Drive, Concord, Tennessee 37720. WA4KFS is a working special events station located at the World's Fair. It operates daily from 1400–0200Z, the open hours of the Fair. WA4KFS operates c.w. at 20–30 kHz above the lower band edges, and s.s.b. at 15 kHz above and below the band edge between the General and Advanced portions of the phone bands and on 28585–28615 kHz. The station also works RTTY and SSTV on the usual frequencies. QSL via W4PKM. *(Thanks to AA4AK for this data.)*

Notes

A lot of data, maps, etc., received from KH6MD seem to indicate that the spot from which most operations have been made as Kalawao County, Hawaii, have actually been (unintentionally) in Maui County. More about this later.

If you worked special event station W5RIN September 25 and 26th, you can receive a Spindletop Award. This operation was sponsored by the Beaumont ARC during the "Glady's City Boom Days" 81st Anniversary of Spindletop, home of the Lucas Gusher. Certificate and brochure on the history of Spindletop for a large s.a.s.e. (including contact number) to BARC, P.O. Box 8358, Lumberton, Texas 77711. *(Thanks to Brenda, N5EKG, for this data.)*

Dutch Certificate Guide lists particulars of more than 75 certificates and awards available from The Netherlands. The cost is U.S. $3.00 in Europe and U.S. $4.00 elsewhere (plus postage). Order from VERON Amsterdam, P.O. Box 9, 1000 AA Amsterdam, The Netherlands; or John Hofstee, VE3IZH, 425 Boyne Avenue, Listowel, Ontario, Canada N4W 3K5.

If you worked WB2BBD/2 in Cortland County, N.Y., during the CW County Hunters Contest, July 24 and 25th, it was Art Phillips, WA7NXL. Please QSL to his home QTH, P.O. Box 201, Flagstaff, Arizona 86002.

To celebrate the 25th Anniversary of the Communications Club of New Rochelle, N.Y., an award was offered for one contact with one member or one contact with the club station, K2YCJ, September 4, 5, and 6th. Send QSL's and an s.a.s.e. (4″ × 9½″) to Don Colozze, WB2MZI, 2727 Gifford Avenue, Bronx, N.Y. 10465.

73, Ed, W2GT

a regular feature by
THEODORE J. COHEN, N4XX

THE INS AND OUTS OF THE WASHINGTON SCENE

FCC Commissioners Vote 7-0 To Begin Development Of No-Code Amateur License

As should be well known by now, FCC commissioners unanimously voted on 1 July 1982 to initiate action on a no-code license for the amateur service. To this end, the Commissioners directed the Private Radio Bureau (PRB) to prepare a Notice of Proposed Rule Making (NPRM) in this matter for release later this year.

According to James McKinney, Chief, PRB, the Commissioners were presented with four options:

1. Develop an "experimenter's license," with a technical exam similar in complexity to the current Novice exam. (Rejected)

2. Develop a so-called "high technology" license similar to the Canadian digital license. This license would require the applicant to pass a difficult technical exam on digital theory, among other things. (Approved for inclusion in the NPRM)

3. Develop a subset of the current Technician class license, using the same technical exam but requiring no knowledge of Morse code. Licensees would have all Technician privileges above 30 MHz. (Approved for inclusion in the NPRM)

4. Do nothing. (Rejected)

The deletion of the five-word-per-minute code test and use of the current Technician class technical exam was a PRB proposal. It was set forth for three reasons:

1. It was the most practical way to implement a no-code license at an early date;

2. With 74,000 Technician operators already licensed, the Commission did not want to take privileges away from anyone through the creation of new subbands for no-code licensees;

3. The Commission did not want to create an entirely new class of license.

The Office of Science and Technology (OST) supported the PRB approach, but OST also wanted the high-technology, digital class license to be considered as an alternative. As noted above, both of these proposals will be included in the NPRM.

According to sources within the Commission, release of the no-code NPRM is unlikely until the President signs into law the new amateur licensing procedures embodied in Senate Bill S. 929 (the Goldwater Bill) and House Resolution HR 5008 (a similar bill in the House of Representatives). In addition, release of the NPRM may be delayed until the WARC-79 Treaty is ratified by the U.S. Senate.

8603 Conover Place, Alexandria, VA 22308

Former Operator Imprisoned for Unlicensed Operations

Richard A. Burton, a former amateur radio operator, was found guilty by a Federal judge on charges of using profane, obscene, and indecent language over the radio, and of unlicensed radio operations. U.S. District Court Judge Manuel L. Real, who handed down the decision of guilty on two counts of broadcasting obscene language and four counts of operation without an FCC license, sentenced Burton to serve six months in jail.

Burton, 38, made the unlicensed radio communications from his residence in Reseda, CA, during November 1981, January 1982, and April 1982.

The FCC had suspended Burton's radio operator's license in September 1981, finding that he had violated several FCC Rules and Regulations (including the broadcast of obscene, indecent, and profane language). According to the Commission, Burton continued making such broadcasts, and so, in April, he was arrested and his equipment seized. In May 1982, a Federal grand jury returned a seven count indictment on the charges, and the case went to trial in June.

On 28 June 1982, Judge Real sentenced Burton to eight years imprisonment, with all but six months of the sentence suspended. Burton was also sentenced to five years of probation and was ordered to perform 1500 hours of community service work upon his release.

In commenting on the stiff treatment of Burton, U.S. Attorney Steven S. Trott stated that he "... hopes the sentence will be a deterrent to those operators who abuse their privileges." A similar thought was expressed by Richard Smith, Chief, Field Operations Bureau, FCC, who said: "We are deregulating the various radio services wherever possible. But what few rules we do have must be complied with, and we intend to see that this happens!"

Burton should have begun to serve his six-month jail sentence on 6 July 1982. However, an appeal was expected.

FCC Revokes Amateur's Station and Operator Licenses

Assistant Chief FCC Administrative Law Judge Thomas B. Fitzpatrick has revoked the license for amateur radio station KB6TG, licensed to Kenneth L. Gilbert, Monterey, CA. The judge also suspended Gilbert's operator's license for the remainder of its term.

In an initial decision issued in May 1982, Judge Fitzpatrick concluded that evidence showed Gilbert to have repeatedly and deliberately interfered with other amateur radio operations during March 1981. These offenses alone were serious enough to merit revocation and suspension of the station and operator's licenses. However, the judge found that during that same time period, Gilbert violated another Commission Rule by transmitting indecent language.

The proceeding was initiated in September 1981 by the FCC's Private Radio Bureau, which ordered Gilbert to show cause as to why his licenses should not be revoked and suspended.

CQ Presents Exclusive with Representative of the National Cable TV Association

As part of its continuing program of publishing the latest word on matters of vital interest to the amateur service, this month's issue of *CQ* contains an exclusive interview with Wendell H. Bailey, a spokesman for the National Cable Television Association (NCTA). The subject of the interview is cable television interference (CATVI), an issue of concern to both the cable television industry and amateurs alike. Discussed with Mr. Bailey are topics such as the nature of the CATVI problem, cable TV standards, steps the NCTA have taken (and are taking) to resolve CATVI problems around the country, and suggestions as to how amateurs can assist in bringing CATVI problems to an early resolution.

If you live in an area served by cable television, or if such service will shortly be provided to you and your neighbors, you will not want to miss this important

exchange on CATVI with one of the cable television industry's most knowledgeable representatives.

Subaru Admits Its Automobiles are Susceptible to R.F.

According to *AMATEURADIO,* a publication of the Public Information Office of the ARRL, the Customer Relations Manager of Subaru Atlantic, Inc., C. Lynn Swinney, has advised potential customers not to buy a 1982 Subaru if they intend to install "CB's, HAMS's (sic) Garage door openers, etc."

The problem with the 1982 models is that the electronically controlled carburetor and the electronic control module are susceptible to strong radio frequency fields. A warning to this effect is included in the owner's manual, but Subaru sales personnel and some service managers know little, if anything, about the problem.

It is unfortunate that Subaru hasn't taken action to correct the problem on all its 1982 model-year cars! For regardless of whether the r.f. signal is generated in the car or by a transmitter in a nearby automobile, the 1982 Subaru can still be expected to malfunction in the presence of a strong signal.

Given the diversity of mobile radio transmitters used today, it would be in the customer's and Subaru's best interests for this manufacturer to correct his electronic design deficiencies at the earliest possible date.

Commission Ponders Action on Power Measurement Technique and Use of Digital Codes

As this is written, two items of concern to the amateur service are "on circulate" within the Commission:

1. Measurement of Power Output. The Commission is considering the release of a Notice of Proposed Rule Making (NPRM) which would propose that the method used to measure transmitter power be changed. Specifically, the proposal would be to measure p.e.p. output power versus d.c. input power.

2. Use of Digital Codes above 50 MHz. The Commission is considering the release of a Report and Order which would, with few exceptions, permit amateurs to use almost any digital code in their work above 50 MHz. Limitations would be placed, however, on the bandwidths used.

According to James McKinney, Chief, Private Radio Bureau, FCC, it is expected that both items will be approved and released by the time this issue is mailed.

Because amateurs will be called upon to comment on the proposed method for power measurement, Steve Lett, an Engineer with the Private Radio Bureau, encourages readers to give thought to their submissions. Said Lett: "Objective, well-documented responses which educate the FCC's staff on the amateur's position best serve the interests of both the Commission and the amateur service."

AMRAD Continues H.F. Packet Radio Experiments

Earlier this year, AMRAD members Dave Borden, K8MMO, and Paul Rinaldo, W4RI, made a successful two-way 1200-baud packet radio contact on 10 meters between two northern Virginia suburbs. The contact, which lasted over two hours, was marked by high background noise levels on both signals. Regardless, most packets were received without "retries." This was true of both long and short packets (the latter being up to two lines in length). Previous experience had indicated that packets should be kept shorter than half a line.

Receiver tuning was found to be somewhat critical. However, once tuned, receiver stability was such that no retuning was necessary for about 45 minutes. Signals were relatively steady in strength, with only slow, flat fading observed at times.

Anyone interested in working Washington, D.C., on 10 meters using packet switching is urged to call W4RI days or evenings at (703) 734-0878.

For more information on AMRAD experiments in packet switching, and on the packet switching activities of groups around the U.S. and Canada, contact: Mr. Paul Rinaldo, President, Amateur Radio Research and Development Corporation (AMRAD), 1524 Springvale Avenue, McLean, VA.

UoSAT Rescue Involves Major Resource

According to *AMSAT Satellite Report,* a publication of the Radio Amateur Satellite Corporation, a new attempt will be made to overcome the persistent commanding problems experienced to date with UoSAT. The effort, which will involve a government-owned dish operated by SRI International in Menlo Park, CA, is intended to restore control of the first amateur scientific satellite. Readers will recall that in mid-April, a command software error resulted in both the 2 meter and the 70 cm beacons being commanded "on" simultaneously. The presence of both beacons effectively desensed both command receivers (one each on 2 meters and 70 cm), and controlling the spacecraft thereafter has proven impossible.

The SRI dish is indeed impressive. When operated at 435 MHz, the dish has a gain of 42 dBd. To translate this into power figures, 750 watts fed into the dish will produce an effective radiated power of nearly 12 megawatts! One AMSAT pundit, who shall remain anonymous, noted that "At these flux levels, UoSAT will respond to command . . . or incandesce . . . or both. The only real question is which will occur first!"

For more information on the UoSAT satellite, and on other AMSAT activities, contact: The Radio Amateur Satellite Corporation, P.O. Box 27, Washington, D.C. 20044.

Cable Systems Not Always at Fault in Cases of CATVI

We've said much in this column about the problem of interference to, and from, cable television systems. This so-called "cable television interference" (CATVI), however, is not always the result of a poorly shielded drop on a cable distribution system.

Readers should remember that despite the use of proper engineering techniques by the cable company, and despite the operation of an amateur transmitter in accordance with good engineering practices, some television receivers on the market today are still susceptible to fundamental overload.

If you are experiencing CATVI, work with the engineering staff of the cable company to isolate the problem. If the cable system's drop line is not leaky, try using a high-pass filter on the television receiver affected. Substitution of another TV receiver is also recommended. Chances are good that under such tests, the affected TV receiver will be found susceptible to overload. In such cases, the responsibility for correcting the receiver's design deficiencies rests with the manufacturer.

H.R. 5008 Clears House Committee

Early in June 1982, House Resolution H.R. 5008 (the FCC's "Track 1" legislation) passed the House Energy and Commerce Committee. The bill, sponsored by Representative Wirth, is similar to Senate Bill S. 929, which was sponsored by Sen. Goldwater.

The House bill is now expected to obtain House passage with a minimum of difficulty. Further, owing to the similarities between H.R. 5008 and S. 929, little if any delay is expected when the two bills go to House-Senate conference.

The House and Senate bills contain numerous provisions which are important to the amateur service, including:

- Enabling legislation which would give the FCC the authority to set r.f.i. susceptibility standards for electronic home-entertainment devices;
- Provisions which would enable amateurs to give both code and technical exams for all classes of amateur licenses;
- Authorization for amateurs to assist the FCC in monitoring for violations of the Commission's Rules and Regulations.

Barring any last minute problems, it is expected that the President will sign these and other proposed measures into law before year's end.

AFCEA'S 1982 Luncheon Breaks All Records

With attendance up over 30% from last year, 180 amateurs, spouses, and friends enjoyed what many have called "the best Amateur Luncheon ever!"

Meeting on June 15th at the Sheraton Washington Hotel as part of the Armed Forces Communications and Electronics Association's (AFCEA's) 36th Annual Convention, the attendees—representing the Federal government, industry, and the military—were first treated to a hot entree prepared and served by the hotel's expert staff. Following the introduction of the head table and of everyone present, Stu Meyer, W2GHK/4, presented David Talley, W2PF, with a certificate marking Dave's 65th year as a licensed amateur (1917–1982).

As in previous years, representatives from the FCC were invited to review issues of significance to the amateur community. In order of their presentations, the following individuals summarized FCC actions and/or concerns on the items noted:

Michael Kennedy, Office of Science and Technology

- Amateur access to the new WARC bands at 10, 18, and 25 MHz. (Basically, Mike indicated that the Commission could not proceed with such allocations without ratification of the WARC Treaty by the U.S. Senate.)
- Spread spectrum. (The review covered recent AMRAD tests and replies to the FCC's Notice of Inquiry on spread spectrum modulation techniques.)

Richard Smith, Chief, Field Operations Bureau

- Enforcement. (Dick indicated that enforcement activities against unlicensed operators, as well as against amateur operators who violated the Commission's Rules, were proceeding at a record pace; in most cases, fines of up to $2000 have been imposed, though one amateur now faces a maximum sentence of eight years imprisonment and a $60,000 fine.)
- R.f.i. standards. (It was Dick's hope that the passage of "enabling" legislation on r.f.i. would be sufficient to cause television receiver manufacturers to improve the immunity of their sets to strong, "out-of-band" signals.)

James McKinney, Chief, Private Radio Bureau

- CCIR. (Jim acknowledged the importance of the CCIR to the frequency allocation process of the ITU, and specifically, reintroduced Mr. Richard C. Kirby, WØLCT/HB9BOA, Director of the International CCIR.)
- Access to the new WARC bands. (Jim took the position that the new 10 MHz band could be opened to U.S. amateurs at this time.)
- Amateur exams. (Comments touched on elements of bills before the House and Senate [H.R. 5008 and S. 929, respectively] which would enable amateurs to give exams for all grades of amateur licenses.)
- H.f. expansion. (Indications are that the FCC's position on expansion of the 20 meter phone band should be out later this year.)
- No-code amateur license. (This item is recognized as being highly controversial. However, Jim only noted that one did not have to possess a knowledge of Morse code to make significant contributions to the amateur service.)

Edward Minkle, Managing Director, FCC

- Congressional inquiries. (Ed reminded those present that letters to their Congressmen regarding FCC business ended up on the desks of the various bureau chiefs within the FCC for answers.)
- Letter of congratulations to David Talley. (Ed read a letter from FCC Chairman Mark Fowler congratulating Dave on 65 years in amateur radio.)

The comments by FCC personnel were followed by brief remarks by Perry Williams (W1UED, ARRL Washington Area Coordinator), David Sumner (K1ZZ, newly elected ARRL General Manager), and Alan Dorhoffer (K2EEK, Editor, *CQ*).

Finishing off the festivities was a drawing for 30 door prizes, including a pair of gold-plated Eimac 8874 tubes; numerous antennas; handbooks on general radio techniques, antennas, propagation, and packet switching; free subscriptions to *CQ* and to *The Long Island DX Bulletin,* numerous *Callbooks* (both domestic and foreign); and items such as a 24-hour digital clock. These gifts were donated by the following people or organizations:

- The American Radio Relay League
- The Comm Center (Laurel, MD)
- *CQ* magazine
- Electronic Equipment Bank (Vienna, VA)
- ENSCO, Inc.
- *The Long Island DX Bulletin* (H. McCoy, W2IYX, Huntington, NY)
- Roy Rosner (handbook on packet switching)
- Varian-Eimac

At the completion of the luncheon, attendees had an opportunity to see displays of the latest r.f. and computer-based equipment available from The Comm Center and the Electronic Equipment Bank.

Your Washington Editor, Vice-President-at-Large for AFCEA and host of the

Amateur Luncheon, takes this opportunity to thank Col. "Bud" Deem and his AFCEA Operations Staff for their invaluable assistance in arranging this year's luncheon. Appreciation is also expressed to Ms. Mary Ellen Stoner of the Electronic Equipment Bank for her assistance throughout the luncheon.

See you at next year's Amateur Radio Luncheon?!

AMRAD Recognizes Science Fair Winners

At its June 1982 meeting, the Amateur Radio Research and Development Corporation (AMRAD) recognized three northern Virginia high school Science Fair winners for their technical excellence. Award winners and their projects were:

- Thomas Falstreau, KA4JXF—Computer Aided Instruction;
- Steven B. Waltman—A Computer-Controlled Nuclear Magnetic Resonance Spectrometer;
- J.B. Wilson—Paddle Battle, A Computer Game.

In addition to receiving a year's membership in AMRAD, the three winners each received a subscription to a radio or computer magazine of their choice.

AMRAD also recognized eleven other students who received Honorable Mentions in the Science Fair competition.

The AMRAD Award Meeting is an annual event held to honor high school students who demonstrate special skills in electronics and computer technology. The meeting also serves to introduce many of the students to amateur radio.

Phase III Operations Manual in Development

As noted in an *AMSAT Satellite Report,* Dick Peacock, W2GFF, is making excellent progress on the preparation of a Phase III Operations Manual. Dick is acting as editor for the comprehensive text, which will provide practical instructions and information on how the Phase IIIB satellite works. Also to be included are specific operating techniques, tips, and general considerations on using the new breed of amateur satellite.

The manual is expected to answer many of the "how to" questions most likely to be asked by the neophyte as well as by veteran satellite operators. Publication is expected in early 1983, shortly after the Phase IIIB launch.

Solar Houses All A-Buzz

According to an article in *Science News,* inverters used to convert d.c. to a.c. in solar homes are a constant source of radio-frequency interference (r.f.i.) in and around such homes.

John W. Adams of the National Bureau of Standards in Boulder, CO, found that the inverters emit r.f. radiation over a broad range of frequencies, including the a.m. broadcast band.

At this time, the problem is not considered serious because few homes are equipped with photovoltaic solar systems. However, Adams felt that the manufacturers of inverters used in solar homes should be aware of the problem so that appropriate steps could be taken to shield the devices and filter their output.

Commission Takes Action on Military Restricted Areas

According to John Johnston, Chief, Personal Radio Branch, PRB, FCC, the Commission, on 1 July 1982, approved the areas around two Air Force bases in Alaska and North Dakota as "Military Restricted Areas." This means that amateurs in these areas who seek to use more than 50 watts input on the 420–450 MHz band must coordinate their activities with both the Air Force and the appropriate FCC Engineer-in-Charge. The Commission took this action to protect 420–450 MHz air defense radar systems from interference caused by amateur operations.

The Commissionalso expanded the restricted areas previously defined around two Air Force bases in California and Maine.

AMSAT Seeks Executive Director/General Manager

The successful launch of the Radio Amateur Satellite Corporation's first Phase III satellite in early 1983 will bring unprecedented growth to this primarily volunteer-managed organization. As such, the Corporation will require a full-time, professional Executive Director/General Manager.

The successful candidate will:

- develop and implement innovative educational programs;
- manage and coordinate the work of hundreds of volunteers worldwide who participate in AMSAT's activities;
- oversee day-to-day operations of the Corporation;
- lead a comprehensive fund-raising activity.

The position is located in the Washington, D.C., area, and will require some travel. An engineering/technical background is desirable, but the successful candidate must have an active interest in amateur radio.

Send resumes to: Search Committee, Attn.: Roy D. Rosner, AMSAT, P.O. Box 27, Washington, D.C. 20044.

Washington Man Fined More Than $100,000 in Pay-TV Piracy Case

According to *The Washington Post,* a Washington, D.C., "entrepreneur" was ordered to pay more than $100,000 in damages for selling devices to intercept the microwave signals of a local Home Box Office (HBO) outlet. Specifically, a federal judge ordered William Early, the owner of AIDA TV Sales and Service, to pay Marquee HBO of Rockville, MD, $102,375 because it is illegal to sell or use private microwave receivers designed to pick up signals in the Multipoint Distribution Service (MDS). The ruling was based on Section 605 of the Communications Act of 1934 (as amended).

Early contended that he was doing nothing wrong since the signals are broadcast everywhere. Said Early: "My contention is that, if you don't want me to receive the signal, then keep it out of my bedroom." What Early failed to note, however, is that the HBO signals are not in the Broadcast service, and so, they are covered by the secrecy provisions of Section 605.

Marquee, as well as other HBO distributors, has recently hired investigators to track down individual "video bandits" and the suppliers of unauthorized microwave receivers. The conviction of William Early suggests that their efforts are not only showing success, but also, that the courts will sustain their argument that HBO signals are not in the public domain.

Oregon County Imposes Curbs on Radiation

As noted in *The Wall Street Journal,* Oregon's Multnomah County recently set the tightest broadcast radiation standards in the U.S. The new rule is designed to ensure that health hazards resulting from r.f. heating effects are eliminated.

The new rule limits the r.f. energy at ground level near antenna structures to 50 microwatts per square centimeter of exposed surface, with the measurement averaged over a period of one-half hour. This is far more stringent than the 1000 microwatt standard suggested by the American National Standards Institute; the 1000 microwatt level is also under consideration by the National Institute of Occupational Safety and Heath. Technical advisers of Multnomah County had suggested a radiation limit of 200 microwatts, identical to that adopted by the state of Massachusetts.

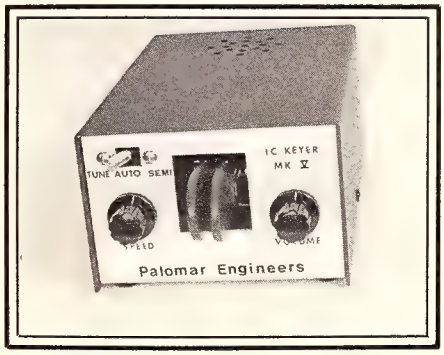
The Multnomah County regulation was intended to address r.f. radiation hazard problems in the 30 to 300 MHz range. The ruling, effective 31 July 1982, exempted all amateur radio operations.

Your Washington Editor thanks the following individuals for their contributions to this month's column: Mr. Joe Casey, Chief, Investigations Branch, FOB, FCC, Mr. Larry Clance, Esq., Attorney Advisor, FOB, FCC, and the San Francisco Regional Director of the FCC, for their contributions to this column.

CQ SHOWCASE

Palomar Engineers Electronic Keyer

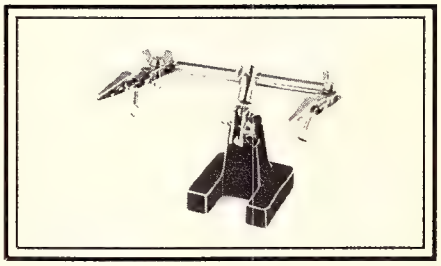
Palomar Engineers has announced the new IC Keyer MK V. It features a 1 amp silver contact relay output that will key all amateur rigs and most shipboard transmitters. It keys either polarity without change of jumpers. The keyer features the fully adjustable Ham-Key paddle and Curtis IC. It is available with either standard operation or type "B" action.



Packaged with a burnished aluminum panel and textured black cover, the keyer has a sidetone oscillator, speaker, volume and speed controls, mode switch, and an internal pitch control. This keyer operates from a clip-on 9-volt battery for complete portability or uses a 9- or 12-volt d.c. power supply. The MK V sells for $132.50 plus $4 shipping/handling. For more information, contact Palomar Engineers, 1924-F West Mission Road, Escondido, CA 92025, or circle number 102 on the reader service card.

OK Machine and Tool "Helping Hands" Assembly

The HPCB-15 assembly aid from OK Machine and Tool Corporation is a unique "two-handed" holding fixture for aiding all types of electronic and mechanical assembly work. It features two strong "alligator" clips for reliable holding action plus quick and easy clamping and release. Both clips are mounted in ball joints, and the connecting bar is mounted in a third ball joint, enabling complete articulation and flexibility to suit any task. All ball joints may be locked in any position, and the entire assembly is mounted in a heavy cast metal base to provide stability during use, while the rugged all-steel construction assures durability. The HPCB-15 is ideal for PC board stuffing, electronic projects, mechanical work, model making, etc.



For more information, contact OK Machine and Tool Corporation, 3455 Conner St., Bronx, NY 10475, or circle number 103 on the reader service card.

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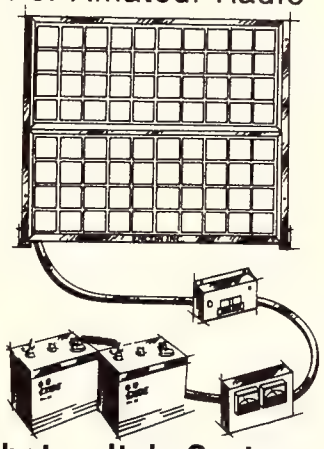

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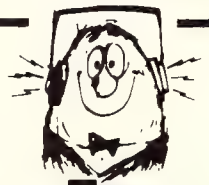

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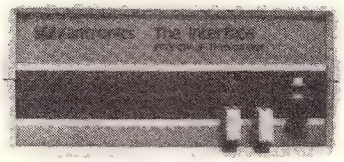

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"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Shortwave Listening—Part VI of VI

This is the concluding part of this shortwave listening article. The previous parts provide the introduction, plus coverage of the legality of eavesdropping, variety of transmissions, radio waves, selecting listening frequencies, publications, tapes, clubs, equipment and accessories suppliers, receivers, loudspeakers, earphones, antennas, and ground. You are urged to read the entire article to derive maximum benefit from it. Despite the length of this article, it is just a brief introduction to the field of shortwave listening. There are classes of shortwave listeners, just as there are classes of amateur operators; there are also several special-interest groups.

Signal Reporting Codes

SINPO. Many broadcast stations prefer to receive reception reports in a simplified and standardized system known as a SINPO report, which has the following meanings:

(a) Signal strength (S-QSA) is rated:
5–Excellent 2–Poor
4–Good 1–Barely audible
3–Fair

(b) Man-made interference (I-QRM), atmospherics/noise (N-QRN), and radio wave propagation (P-QSB) are each rated:
5–None 2–Severe
4–Slight 1–Extreme
3–Moderate

(c) Overall merit (O-QRK) is rated:
5–Excellent 2–Poor
4–Good 1–Unusable
3–Fair

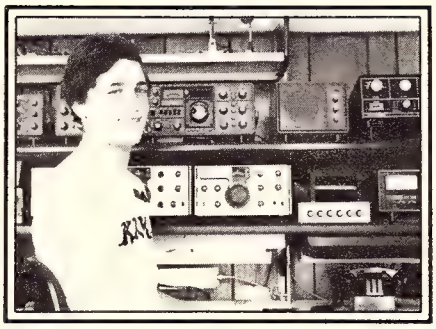
As an example, a SINPO report of 54354 indicates that the received signal had (S-5) excellent strength, (I-4) suffered from slight man-made interference, (N-3) had moderate atmospheric noise (static), (P-5) had no fading characteristics, and (O-4) had good overall merit.

SINPFEMO. This signal reporting code is more detailed than the SINPO code, which makes it more useful to stations receiving these reports. The meanings are as follows:

Strength
5–Excellent 2–Poor
4–Good 1–Barely audible
3–Fair

Interference
5–Nil 2–Severe
4–Slight 1–Extreme
3–Moderate

2814 Empire Ave., Burbank, CA 91504



Twelve-year-old Russ Alman, KA8OCR, who lives in Rockford, Michigan, obtained his Novice license around Christmas 1981 to surprise his grandmother, WA1WGX, and grandfather, WN1TKD, Charlotte and Harold Alman, who live in Medway, Massachusetts; he works them on a schedule, along with a Canadian amateur he met on the air. Russ has contacted amateurs in 18 countries and 46 states. He worked almost 600 contacts in this year's Novice Roundup contest. Russ shares this station with his proud father, Phil, KO8T. He operates a pair of Kenwood twins and enjoys using the Grandmaster memory keyer purchased for contest usage. His antennas include a KLM KT-34-XA triband Yagi-Uda, Hy-Gain HyTower vertical, and several dipoles. Russ has his code speed up and he hopes to upgrade to the General license the next time the FCC conducts examinations at Grand Rapids.

Noise
5–Nil 2–Severe
4–Slight 1–Extreme
3–Moderate

Propagation Disturbance
5–Nil 2–Severe
4–Slight 1–Extreme
3–Moderate

Fading
5–Nil 2–Fast
4–Slow 1–Very fast
3–Moderate

Excellence of modulation
5–Excellent 2–Poor
4–Good 1–Very poor
3–Fair

Modulation depth
5–Maximum 2–Poor or none
4–Good 1–Continuously overmodulated
3–Fair

Overall rating
5–Excellent 2–Poor
4–Good 1–Unusable
3–Fair

Older Reporting Systems. Several other signal reporting systems have been used in the past, but they are no longer recommended. These outdated systems include FRAME, RAFISBENQO, RISAFMONE, and Q-signals (see SINPO references).

QSL Cards. A fascinating side interest associated with shortwave listening is the exchange of confirmation cards. The three letter Q-signal QSL means "I acknowledge receipt --", when used during the exchange of messages by radio. Consequently, the cards used to acknowledge/confirm receipt of a station's radio transmissions are called QSL cards. These cards are both interesting and attractive; they are available from many commercial, private, and government stations.

Card Size. QSL cards should be 3.5 by 5.5 inches to be accepted for overseas mailing. If you have them printed by a QSL printer, be sure to specify these dimensions or you may get cards that are other sizes. The Post Office refuses offsize cards (addressed to overseas addresses) and returns them to the senders. A top-quality card is often alleged to improve the return ratio of QSL cards, but an accurate and complete report is more important to the transmitting station than the appearance of a card. Be honest in your reports, because an incorrect or flattering report is of no value to the station which receives it. Also, incorrect reports will probably be recognized as such by experienced operators.

Displaying QSL Cards. Received QSL cards are displayed to best advantage in the clear-plastic card display holders manufactured specifically for this purpose. These holders keep cards clean, allow easy rearrangement, and preclude the need for thumbtack holes or tape spoiling the appearance of your cards. QSL holders are advertised in amateur publications and they are sometimes available at local electronics stores.

QSL Data. Your card should contain space for the SINPO, SINPFEMO, or other report. It should also show your name and address. The make and model (or a brief technical description) of your receiver and antenna should appear on your card. To avoid confusion, it is best to indicate all times in UTC—Universal Time Coordinated (ex-GMT, Greenwich Mean Time)—which is the same everywhere on earth. It is good to have a 24-hour clock set to UTC near your receiver. You must indicate the exact fre-

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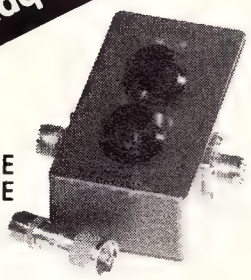

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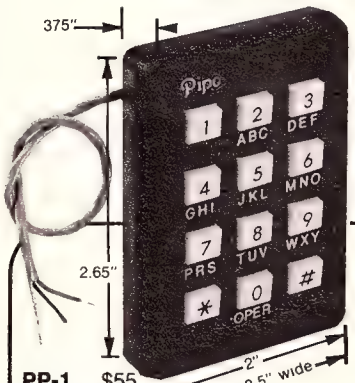

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quency, date, program content, and time of each transmission being reported on your QSL card. Send the completed card to the station which transmitted the signal and you have a good chance of receiving a return QSL, plus additional information about their station and/or country. A typical QSL card is shown in fig. 1. The material on the front side of such cards is usually printed over an appropriate picture or design.

Shortwave Listener Carl Welsh
2814 Empire Avenue
Burbank, California 91504
United States of America
Lat. 34°12.3″N Long. 118°21.3″W

(FRONT SIDE)

This card confirms that Radio Station _____ was heard SINPO_____ @_____ UTC_____ 19_____ on _____ kHz. The program heard was _____

_____

Receiver = Ten-Tec 544
Antenna = 70 foot random-wire with MFJ-943 tuner
remarks: _____

_____

_____

(REVERSE SIDE)

Fig. 1– Typical s.w.l. QSL card.

Stamp Collecting. Since shortwave listeners frequently receive QSL cards from stations in foreign countries, it is natural that many listeners develop a side interest of collecting stamps. If you do not collect stamps yourself, you will be able to make some of your stamp collecting friends happy! If you want to expedite a quick response, you can purchase International Reply Coupons at your Post Office and include them with your foreign cards. These IRCs can be used to purchase postage throughout the world.

IRCs are particularly essential if you want to receive QSL cards from foreign amateurs. A good way to improve your chance of getting a QSL card from a foreign (DX) station is to include a self-addressed and stamped envelope (s.a.s.e.) with the QSL card you send. Attach correct foreign postage stamps to your s.a.s.e. to make it easier for the other person to send a card to you. All she/he has to do is to slip the QSL into your envelope, seal the envelope, and mail it. Foreign postage stamps are available from sources such as George N. Robertson, W2AZX, 7661 Roder Parkway, Ontario, NY 14519. Other foreign stamp sources can be located by perusing amateur radio publications.

Logs

Many shortwave listeners maintain a permanent record of the stations they hear. This record sheet is called a log, and the bound pages of log sheets are known as a log book. S.w.l. log books can be purchased from many sources. Some of the most useful log sheets are provided by s.w.l. clubs. Some s.w.l.'ers print their own log sheets to match their specific needs. Make sure that your log sheets have spaces for all the entries you need to properly fill in QSL cards, plus other information you may want to retain. It is a common practice to mark an asterisk beside each log entry when one sends a confirmation (QSL) card and to encircle the asterisk when the return QSL is received.

Amateur Radio

During your shortwave listening activities, it is inevitable that you will overhear amateur radio operators. There are licensed amateurs in every country in the world, no matter how small or poor it might be in technical development. You may be surprised to hear free-world amateurs in contact with amateurs in Communist countries, but such operation is both legal and commonplace.

Reports. Amateurs originated the practice of swapping QSL cards to verify two-way radio contacts. Amateurs have a ready supply of colorful and interesting QSL cards and several are pleased to respond to your s.w.l. QSL card. However, a SINPO or SINPFEMO report would be a complete mystery to most amateurs because they use a different report system.

This is Russ Latimer, VE1BPP, who helps make it easier for American Novices to contact Nova Scotia. He is a retiree who particularly enjoys ragchewing (chatting), handling messages, and working Novices. Russ only operates code, even though he has full operating privileges with an Advanced amateur radio certificate. His work experience included 12 years as a Radio Officer aboard Canadian merchant ships. Russ holds a 30 w.p.m. (words per minute) Morse code certificate, but he will slow down (QRS) to whatever speed is needed to complete contacts with newer operators. His station includes a Ten-Tec Omni-C Transceiver and a 115 foot long multiband dipole about 50 feet above the ground, which also happens to be 142 feet above sea level. He has had more than 200 DX (foreign) contacts in less than 2 years as an amateur. If you would like to contact Russ on a prearranged schedule, send your callsign and schedule data (date, time, and frequency) to 63 Johnstone Avenue, Dartmouth, Nova Scotia, Canada B2Y 2K6, or call 1-902-466-7135.

Amateur code reports use the following RST (Readability-Strength-Tone) system, and amateur voice transmission reports use the RS (Readability-Strength) portion of the same system.

R-S-T Signal Reporting System

R (Readability)
1–Unreadable
2–Barely readable—some words distinguishable
3–Readable, with much difficulty
4–Readable, with almost difficulty
5–Perfectly readable

S (Strength)
1–Faint—Barely perceptible
2–Very weak
3–Weak
4–Fair
5–Fairly good
6–Good
7–Moderately strong
8–Strong
9–Extremely strong

T (Tone)
1–Extremely rough hissing note
2–Very rough a.c. note, no musical note
3–Rough low-pitched a.c. note, slightly musical
4–Rather rough a.c. note, moderately musical
5–Musically-modulated note
6–Modulated note, slight trace of whistle
7–Near d.c. note, smooth ripple
8–Good d.c. note, a trace of ripple
9–Pure d.c. note

Notes:

(1) Code reports use a 3-number R-S-T report. For example, RST 579 means a received code signal which is perfectly readable (R-5), moderately strong (S-7), and has a pure d.c. note (T-9).

(2) Voice reports just use the readability and strength portions of this system.

Amateur Bands

The most commonly used amateur bands are shown in Table I. Amateurs assign a convenient designation to each band instead of the exact one, just as is done by international broadcasters on their bands. For your convenience, the American voice portion of each ham band is indicated separately in this table. Emission segments are not the same in all countries.

Band Designation (meters)	Entire Band (MHz)	Voice Portion (MHz)
160	1.8–2.0	1.9–2.0
80	3.5–4.0	3.8–4.0
40	7.0–7.3	7.2–7.3
20	14.0–14.35	14.2–14.35
15	21.0–21.45	21.25–21.45
10	28.0–29.7	28.5–29.7
6	50.0–54.0	50.1–54.0
2	144.0–148.0	144.1–148.0

Table I– Frequently used American amateur radio bands.

Single Sideband. As you listen on the amateur bands, you will notice that very little amplitude modulation is used, because most ham voice operation (on 80–10 me-

ters) has switched over to the more efficient and longer range single sideband voice emissions. If your receiver is set to "a.m." mode, a single sideband transmission will be very garbled. Modern receivers have an "s.s.b." mode and it should be used for s.s.b. reception. If your receiver does not have an s.s.b. mode, but does have c.w. (code) reception capability, just move your switch to c.w. and you can use the internal beat frequency oscillator (BFO) to reinsert the carrier needed to listen to s.s.b. signals. With you receiver set for code reception, you can tune in s.s.b. signals for optimum voice quality by carefully adjusting the receiver's fine tuning (bandspread) control or (if there is one) the BFO/PITCH control.

Amateur Band Receiving Conditions. As is true with international broadcasting, the higher frequency amateur bands (20, 15, and 10 meters) are best during the day and during the summer, whereas the lower ones (160, 80, and 40 meters) are best at night and during the winter.

Amateur Publications. If you become (or are) a shortwave listener who develops interest in the amateur radio service, there are several publications available to you, including the following monthly publications:

CQ, 76 North Broadway, Hicksville, NY 11801

Ham Radio, Greenville, NH 03048

QST, American Radio Relay League, 225 Main Street, Newington, CT 06111

Worldradio, 2120 28th Street, Sacramento, CA 95818

73, Peterborough, NH 03458

Several of the companies listed in the publications coverage in this article also have amateur radio books available.

Amateur Radio Clubs. If you become even more interested in amateur radio, you should attend a few meetings of your local amateur radio club. Many amateur clubs conduct licensing programs. Your local electronic stores should be able to provide meeting information on local clubs. Many amateurs display call signs on their car license plates, and they can be approached for information about local amateur radio activities. The best single source of information on amateur radio is the American Radio Relay League, 225 Main Street, Newington, CT 06111. The ARRL represents American amateurs and provides many aids for both beginning and experienced amateurs.

Getting Started as an Amateur. It is a natural reaction to want to contact distant stations heard on the air. This is a very logical extension of shortwave listening. The amateur radio licensing structure makes it easy for anyone to get on the air with a beginner's (Novice) license after just a brief training time. The Novice license examination includes a test of code receiving and code sending abilities at a very slow speed (5 words per minute), plus a simple quiz on basic radio fundamentals and regulations. Novices are granted a five-year, renewable license which permits them to make medium-power (250 watts, input) code contacts on special segments of the 80, 40, 15, and 10 meter amateur bands. These segments are 3.7–3.75, 7.1–7.15, 21.1–21.2, and 28.1–28.2 MHz, respectively. If you are practicing slow-speed code reception as part of your s.w.l. activities, these are prime frequencies to find those who send slow enough to be understood by a beginner. The Novice license is available to anyone who does not hold any class of amateur radio license, regardless of any amateur license she/he may have held in the past.

Ben Franklin, KA4MIU, operates from Mt. Washington, Kentucky. He has been active on the air more than two years now, and he has contacted 47 states and 12 countries so far. He still needs contacts with Alaska, Hawaii, and South Dakota to earn the WAS (Worked All States) award. Ben used a Heath HW-16 Transceiver for awhile. His present station includes a Ten-Tec Century 21 Transceiver, 80/40 meter dipoles, and a triband Hy-Gain TH-3JR Yagi-Uda. He is a member of the Bullitt Amateur Radio Society and QRP Amateur Radio Club International.

Upgrading to Higher Amateur Licenses. Many Novices bypass the Technician class of amateur license and they move right up to the General class ticket. The General license is also good for 5 years, provides excellent operating privileges (on voice, code, teletype, TV, etc.), permits high power (1000 watts, input) transmissions, and is renewable. The General ticket is the prime objective of the beginner and one can be justifiably proud of earning this license. Once one has earned the General license, she/he is urged to upgrade to the Advanced (and finally) the Extra licenses to have increased operating privileges. It is not difficult to become a licensed amateur radio operator, and it is exciting to work amateurs in hundreds of other countries. Amateurs are allowed to operate from ships, cars, airplanes, and other crafts, as well as from fixed locations.

Summary

If you are not yet a shortwave listener or an amateur, I hope this article prompts you to become both. The world is truly at your fingertips in both cases. I have tried to provide reasonably complete coverage of important subjects without being too technical to be easily understood. Radio and electronics are simple; they just involve putting known formulas to work in practical ways. After you set up your equipment, I hope it serves as a bridge between your home and people all around the world.

If you are a shortwave listener, but not an amateur, I hope you have learned a few ways to improve your station and operation. I also hope you will decide to expand your radio activities by becoming an active amateur radio operator. I believe that the best prospective amateur is a shortwave listener.

If you are an amateur, but not a shortwave listener, I hope this article causes you to start doing some serious shortwave listening. Amateur radio and shortwave listening are very compatible; increased proficiency in either one can enhance one's enjoyment of the other. In most cases, amateur radio equipment can be used to do some shortwave listening without being modified. Many modern transceivers have spare bands that can be used for shortwave listening simply by adding correct crystals.

CQ World-Wide DX Contest All-Time Phone Records

BY FREDERICK CAPOSSELA, K6SSS

In the records listed below, boldface listings denote world records. Number groups after calls are: year of operation, total score, contacts, zones, and countries. All-band and Multi-Operator records include a band-by-band breakdown of the world leader in each category.

Single Operator/Single Band

WORLD RECORD HOLDERS

1.8	KV4FZ('76) 37,584	380	11	37
3.5	KV4FZ('75) 275,319	1,297	23	80
7.0	ZL1BIL('81) 443,646	1,245	33	90
14	VP2KAA('81) 2,011,185	4,186	37	150
21	VP2KAC('81) 1,783,500	3,941	37	137
28	OH2MM/CT3('79) .. 1,827,150	4,068	37	113

AFRICA

1.8	No Entrant			
3.5	CT3BZ('79) 235,113	772	22	87
7.0	EA8CR('74) 253,528	639	31	103
14	CR6WW('74) 1,058,446	2,152	35	132
21	EL2AV('81) 1,404,936	3,087	35	117
28	OH2MM/CT3('79) .. 1,827,150	4,068	37	113

ASIA

1.8	4X4NJ('81) 3,942	55	6	21
3.5	VE3MR/4X('71) 197,106	742	22	69
7.0	4Z4DX('81) 241,368	721	26	87
14	VE3BWK/4U('78) .. 1,061,634	2,532	39	122
21	4S7AAG('81) 918,925	2,897	38	137
	(Opr. OH2BCP)			
28	4X0U('80) 1,187,200	2,555	37	123
	(Opr. 4X4UH)			

EUROPE

1.8	UP2BAW('81) 20,091	525	7	30
3.5	I3MAU('75) 113,535	778	18	69
7.0	I6NOA('81) 292,152	1,042	35	113
14	I5NPH('80) 1,062,936	2,429	37	134
21	YU3TU('81) 1,312,793	2,644	40	141
	(Opr. YU3ZV)			
28	9H1EL('81) 1,355,760	3,662	36	132

NORTH AMERICA

1.8	KV4FZ('76) 37,584	380	11	37
3.5	KV4FZ('75) 275,319	1,297	23	80
7.0	VP2KAE('81) 432,942	1,600	27	91
14	VP2KAA('81) 2,011,185	4,186	37	150
21	VP2KAC('81) 1,783,500	3,941	37	137
28	KV4FZ('79) 1,482,525	4,079	39	126

OCEANIA

1.8	KH6CC('79) 2,975	63	9	8
3.5	KH6XX('77) 116,416	606	28	40
7.0	ZL1BIL('81) 443,646	1,245	33	90
14	KG6DX('81) 923,510	1,909	39	128
21	KP4KK/DU2('81) .. 1,413,042	3,675	38	104
28	KH6XX('80) 1,762,332	4,212	37	106

SOUTH AMERICA

1.8	HK4EB('76) 3,672	34	4	9
3.5	4M3AZC('80) 181,794	760	19	63
7.0	CX4CR('76) 363,110	1,125	30	80
14	FY7AK('76) 1,415,329	2,950	36	127
	(Opr. F5QQ)			
21	YV3BJL('81) 1,231,630	3,100	35	102
28	ZZ5EG('81) 1,760,130	3,760	37	125

Single Operator/All Band

AF	EA8AK('81) 9,974,811	5,506	152	457
AS	4X0U('81) 3,497,208	2,774	116	313
	(Opr. 4X4UH)			
EU	G3FXB('79) 4,708,014	3,710	116	341
NA	HI8PGG('81) 9,009,721	7,190	131	392
	(Opr. N1GL)			
O	KH6XX('81) 5,713,434	4,912	131	262
SA	9Y4VT('81) 11,085,529	6,680	140	419
	(Opr. N6AA)			
QRP	I5NSR('81) 670,133	959	83	230

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	50	6	10
9Y4VT	3.5	257	14	43
(1981)	7.0	363	22	63
11,085,529	14.0	1,800	34	111
	21.0	1,103	33	89
	28.0	3,107	31	103
	Total	6,680	140	419

Multi-Operator/Single Xmtr.

AF	9L1CA('78) 7,367,846	5,393	118	340
AS	R6F('79) 9,029,396	5,643	137	411
EU	I4RYC('80) 9,918,368	5,997	139	453
NA	HI8XWP('79) 9,872,267	7,603	134	417
O	KC6ZR('80) 7,605,360	6,197	137	283
SA	FY7BC('78) 8,989,695	6,125	124	371

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	-	-	-
I4RYC	3.5	73	10	51
(1980)	7.0	306	18	59
9,918,363	14.0	1,259	38	114
	21.0	1,370	38	114
	28.0	2,989	35	115
	Total	5,997	139	453

Multi-Operator/Multi-Xmtr.

AF	EA8CR('77) 21,351,898	10,290	153	544
AS	EX9A('78) 15,364,080	9,233	164	519
EU	YU3EY('79) 16,646,364	9,562	153	528
NA	VP2KC('79) 37,770,012	17,767	175	677
O	KH6XX('79) 21,990,252	10,989	184	494
SA	P41C('81) 41,957,244	17,718	173	625

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	261	9	21
P41C	3.5	861	22	69
(1981)	7.0	1,752	30	98
41,957,244	14.0	4,837	38	156
	21.0	5,790	39	143
	28.0	4,813	35	138
	Total	17,718	173	625

Club record: Frankford Radio Club ('79) 173,821,640

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BUTTERNUT ELECTRONICS CO.

- Designed to operate on all Amateur Bands at "FULL" Legal Power Input.
- Automatic Band Switching (80/10 meters).
- Automatic Band Switching (160/10 meters) with optional model TBR-160 HD.
- IN STOCK for IMMEDIATE DELIVERY & LOOK at very SPECIAL PRICES . . .
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Model RMK-11 (roof mount kit with multiband radial kit) $39.00.

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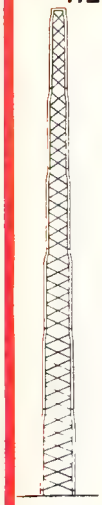

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Freight Prepaid

These rugged beauties are being offered at Big Discounts and - we are shipping them freight prepaid! Look over the specifications and pick the unit most suited for your needs, then - Call us to place your order with Mastercard/Visa or write and include your check for quick shipment - Freight Prepaid!

And – Save even more – include antenna and rotor of your choice with the order and we will ship them along freight prepaid also! Hows that for good old fashioned savings?

Tower Model	Tower Ht.	Load Rating	Ship Weight	Tower Base	Tower Price	Base Price	Total Price
HBX40	40 ft	10 sq ft	164	BXB6	269	24	293
HBX48	48 ft	10 sq ft	303	BXB7	349	26	375
HBX56	56 ft	10 sq ft	385	BXB8	419	30	449
HDBX40	40 ft	18 sq ft	281	BXB7	313	26	339
HDBX48	48 ft	18 sq ft	363	BXB8	399	30	429

BUTTERNUT

HF6V	80-10 mtr. Vertical	$129
TBR 160HD	160-mtr. Coil Kit	$ 49
RM KIT	Roof Mount w/Stub Tuned Radials	$ 39
STR KIT	Stub Tuned Radial Kit	$ 20

CUSHCRAFT

40-2CD	2-El. "Broad Band" 40 mtr. Beam	$279
A3	3-El. Triband Beam	$179
A4	4-El. Triband Beam	$229
A743/A744	40 mtr. Add-on Kit for A3/A4 Antenna	$ 69
R3	New Motor Tuned 20/15/10 mtr. Vertical	$229
AV5	80-10 mtr. Trap Vertical	$ 95
20-3CD	3-El. 20 mtr. Beam	$179
20-4CD	4-El. 20 mtr. Beam	$239
15-3CD	3-El. 15 mtr. Beam	$ 99
15-4CD	4-El. 15 mtr. Beam	$109
10-3CD	3-El. 10 mtr. Beam	$ 76
10-4CD	4-El. 10 mtr. Beam	$ 89
A50-5	5-El. 6 mtr. Beam	$ 65
424B	24-El. 432 MHz "Boomer"	$ 63
214B	14-El. 2 mtr. "Boomer"	$ 69
214FB	14-El. 2 mtr. FM "Boomer"	$ 69
228FB	28-El. 2 mtr. FM "Power Pack"	$189
32-19	19-El. 2 mtr. "Super Boomer"	$ 83
220B	17-El. 220 MHz "Boomer"	$ 75
ARX2B	2 mtr. "Ringo Ranger II"	$ 36
ARX450B	450 Mhz "Ringo Ranger II"	$ 38
A147-20T	2 mtr. Vert. & Horiz. 10-El. Beam	$ 63
A144-10T	10-El. 2 mtr. Satellite Antenna	$ 45
A144-20T	20-El. 2 mtr. Satellite Antenna	$ 69
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V2S	New 2 mtr. Base Vertical	$ 39
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TH7DXS	New Broad Band 7-El. Triband Beam	$379
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TH3JRS	3-El. Triband Beam	$159
TH2MK3S	2-El. Triband Beam	$139
HY-QUAD	2-El. Triband Quad	$279
402BAS	2-El. 40 mtr. Beam	$199
205BAS	5-El. 20 mtr. "Long John"	$299
155BAS	5-El. 15 mtr. "Long John"	$179
105BAS	5-El 10 mtr. "Long John"	$119
204BAS	4-El. 20 mtr. Beam	$229
203BAS	3-El. 20 mtr. Beam	$139
153BAS	3-El. 15 mtr. Beam	$ 79
103BAS	3-El. 10 mtr. Beam	$ 59
DB1015AS	3-El. 10/15 mtr. Beam	$159
64BS	4-El. 6 mtr. Beam	$ 55
66BS	6-El. 6 mtr. "Long John"	$109
18HTS	80-10 mtr. Hy-Tower Vertical	$339
18AVT/WBS	80-10 mtr. Trap Vertical	$ 95
214	14-El. 2 mtr. Beam	$ 35
2BDQ	80/40 mtr. Trap Dipole	$ 49
5BDQ	80-10 mtr. Trap Dipole	$ 99
BN86	80-10 mtr. KW Balun	$ 19

HUSTLER

3TBA	New 3-El. Triband Beam	$199
4BTV	40-10 mtr. Vertical	$ 79
5BTV	80-10 mtr. Vertical	$ 99
G6-144B	2 mtr. Base Vertical	$ 69
G7-144	2 mtr. Base Vertical	$ 99

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40 mtrs.	$15	$ 21
75 mtrs.	$17	$ 32

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KT34XA	6-El. Tribander	$469
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7.2-2	2-El. 40 mtr. Beam	$299
7.2-3	3-El. 40 mtr. Beam	$449
7.0-7.3-4A	4-El. 40 mtr. Beam	$629
144-148-13LB	13-El. 2 mtr. Long Boomer	$ 79
432-16LB	16-El. 432 Mhz. Long Boomer	$ 69
144-150-16C	16-El. 2 mtr. Circular Pol. Beam	$ 99
420-450-18C	18-El. 435 MHz. Circular Pol. Beam	$ 59

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TA-33	3-El. Triband Beam	$199
TA-33 Jr.	3-El. Triband Beam	$149
S-402	2-El. 40 mtr. Beam	$279

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Alliance HD73 (10.7 sq. ft. Rating)	$ 99
Alliance U100 (For small beams & Oscar Elev. Rotor)	$ 45
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½" Copper Hardline w/poly jacket	$1.10/ft.
½" Alum. H.L. Conn (UHF or N · Male or Female)	$15.00
½" Copper H.L. Conn (UHF or N · Male or Female)	$22.00
Amphenol Silver Plate PL259	$ 1.25
Amphenol Nickel Plate PL259	$ 0.90
Amphenol N Type Male Conn For RG213/U	$ 2.95

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HG37SS	37 ft. Self Supporting	$669
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HG54HD	Heavy Duty 54 Ft. Self Supporting	$1499
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HG50MT2	50 ft. Side Supported	$779

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HBX32	32 ft. Free Standing (rated 10 sq. ft.)	$169
HDBX32	32 ft. Free Standing (rated 18 sq. ft.)	$189
HBX40	40 ft. Free Standing (rated 10 sq. ft.)	$229
HDBX40	40 ft. Free Standing (rated 18 sq. ft.)	$259
HBX48	48 ft. Free Standing (rated 10 sq. ft.)	$289
HDBX48	48 ft. Free Standing (rated 18 sq. ft.)	$319
HBX56	56 ft. Free Standing (rated 10 sq. ft.)	$349
FK2548	48 ft. 25G Foldover Tower	$789
FK2558	58 ft. 25G Foldover Tower	$879
FK2568	68 ft. 25G Foldover Tower	$959
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FK4554	54 ft. 45G Foldover Tower	$1219
FK4564	64 ft. 45G Foldover Tower	$1329

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3/16" CCM Cable Clamp (3/16" or 5/32" Cable)		$0.30
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1/4" TH Thimble (fits all sizes)		$0.25
3/8 EE (3/8" Eye & Eye Turnbuckle)		$5.50
3/8 EJ (3/8" Eye & Jaw Turnbuckle)		$6.50
1/2 EE (1/2" Eye & Eye Turnbuckle)		$8.50
1/2 EJ (1/2" Eye & Jaw Turnbuckle)		$9.50
3/16" Preformed Guy Grip		$1.65
1/4" Preformed Guy Grip		$1.85
6" Diam · 4 ft. Long Earth Screw Anchor		$12.50
2" Diam · 10 ft. Long Heavy Duty Steel Mast		$39.00
500D Guy Insulator (5/32" or 3/16" Cable)		$0.95
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5/8" Diam · 8 ft. Copper Clad Ground Rod w/clamp		$11.00

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HYGAIN Model 155 Center Insulator	$ 5.95
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450 OHM H.D. Low Loss Ladder Line	$.14/ft.

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Single Operator/Single Band

WORLD RECORD HOLDERS

1.8	KV4FZ('76) 42,800	390	13	37
3.5	CT3/OH1TV('77) 223,364	1,066	19	57
7.0	KP4AST('73) ..... 447,421 (Opr. WA4PXP)	1,479	32	95
14	VP2KAA('80) ..... 1,244,782 (Opr. N4PN)	3,111	37	117
21	LU8DQ('81) 1,359,711	2,993	37	116
28	LU8DQ('79) 1,033,399	2,775	34	93

AFRICA

1.8	EA8AK('81) 41,470	242	17	41
3.5	CT3/OH1TV('77) 223,364	1,066	19	57
7.0	5A1TW('64) ..... 227,814 (Opr. N2AA)	918	22	64
14	CR6IK('74) 925,386	2,021	38	116
21	TJ1AW('70) 549,888	1,447	35	93
28	FR0MM('79) 978,012	2,590	36	90

ASIA

1.8	4X4NJ('81) 18,252	178	10	29
3.5	UA9TS('81) 122,567	622	17	56
7.0	JE3MCC('81) 240,700	833	30	70
14	UA9ADQ('81) 447,874	1,412	34	88
21	4Z4NUT('80) 519,831	1,500	34	83
28	4X4UH('80) 554,645	1,772	32	83

EUROPE

1.8	G3SZA('79) 21,960	283	12	33
3.5	I4IND('81) 172,782	1,113	19	68
7.0	YU2CDS('79) ..... 361,680 (Opr. YU2RQX)	1,204	32	88
14	OH8SR('81) 672,600	2,151	34	86
21	YU3ZV('81) 732,096	1,957	37	107
28	DK3GI('79) 592,848	1,584	31	101

NORTH AMERICA

1.8	KV4FZ('76) 42,800	390	13	37
3.5	KV4FZ('75) 190,082	789	24	77
7.0	KP4AST('73) ..... 447,421 (Opr. WA4PXP)	1,479	32	95
14	VP2KAA('80) ..... 1,244,782 (Opr. N4PN)	3,111	37	117
21	VP2KAC('80) ..... 1,075,407 (Opr. N4RJ)	2,955	36	105
28	KV4FZ('79) 653,072	2,384	32	87

OCEANIA

1.8	VR3AH('78) 20,310	238	12	18
3.5	VR3AH('76) 178,560	956	24	40
7.0	AH6Z('78) 387,750	1,382	30	64
14	KG6DX('81) 525,420	1,289	37	102
21	KH6XX('78) 816,102	2,311	38	81
28	KG6DX('80) 801,876	2,367	35	79

SOUTH AMERICA

1.8	YV1OB('81) 25,806	258	11	23
3.5	N4JI/HC1('77) 77,748	463	21	36
7.0	CV4DL('75) ..... 230,040 (Opr. CX1BBL)	1,020	24	57
14	PJ9CC('80) ..... 1,209,022 (Opr. K4BAI)	2,914	34	105
21	LU8DQ('81) 1,359,711	2,993	37	116
28	LU8DQ('79) 1,033,399	2,775	34	93

Single Operator/All Band

AF	CT3BZ('81) 5,701,590	4,706	111	294
AS	UF6CR('81) 4,613,355	3,927	104	301
EU	EA2IA('81) 3,057,204	3,078	110	318
NA	KP4RF('78) ..... 4,908,186 (Opr. N6CJ)	3,797	135	379
O	N6BT/AH0('81) 4,241,746	4,083	121	228
SA	9Y4VT('80) ..... 6,116,945 (Opr. N6AA)	4,505	128	329
QRP	YU3BC('80) 702,765	996	85	230

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	91	6	9
9Y4VT	3.5	420	18	53
(1980)	7.0	846	22	62
6,116,945	14.0	1,046	28	71
	21.0	1,089	28	67
	28.0	1,013	27	67
	Total	4,505	128	329

Multi-Operator/Single Xmtr.

AF	EA9EU('80) 5,077,696	3,884	116	326
AS	RG6G('80) 9,720,528	5,358	164	462
EU	YU3EY('81) 7,674,190	4,051	150	345
NA	NP4A('79) 7,982,576	6,100	141	385
O	5W1AZ('76) 2,534,416	3,043	108	176
SA	P41E('81) 8,059,296	5,055	148	388

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	117	9	31
RG6G	3.5	566	22	68
(1980)	7.0	1,161	32	87
9,720,528	14.0	1,122	36	96
	21.0	1,245	35	100
	28.0	1,138	30	80
	Total	5,358	164	462

Multi-Operator/Multi-Xmtr.

AF	EA8CR('78) 17,734,970	9,799	142	463
AS	EX9A('78) 8,721,019	6,882	137	384
EU	OH3AA('81) 9,301,635	6,682	148	447
NA	NP4A('80) 17,627,820	10,846	171	487
O	ZK2RU('81) 5,191,542	4,646	123	256
SA	PJ2CC('79) 20,045,952	11,786	154	422

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	81	6	10
PJ2CC	3.5	704	18	53
(1979)	7.0	1,768	25	76
20,045,952	14.0	3,442	33	95
	21.0	3,244	38	100
	28.0	2,447	34	88
	Total	11,786	154	422

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  A1 CW
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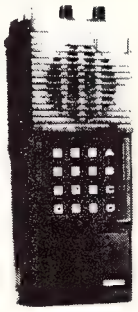

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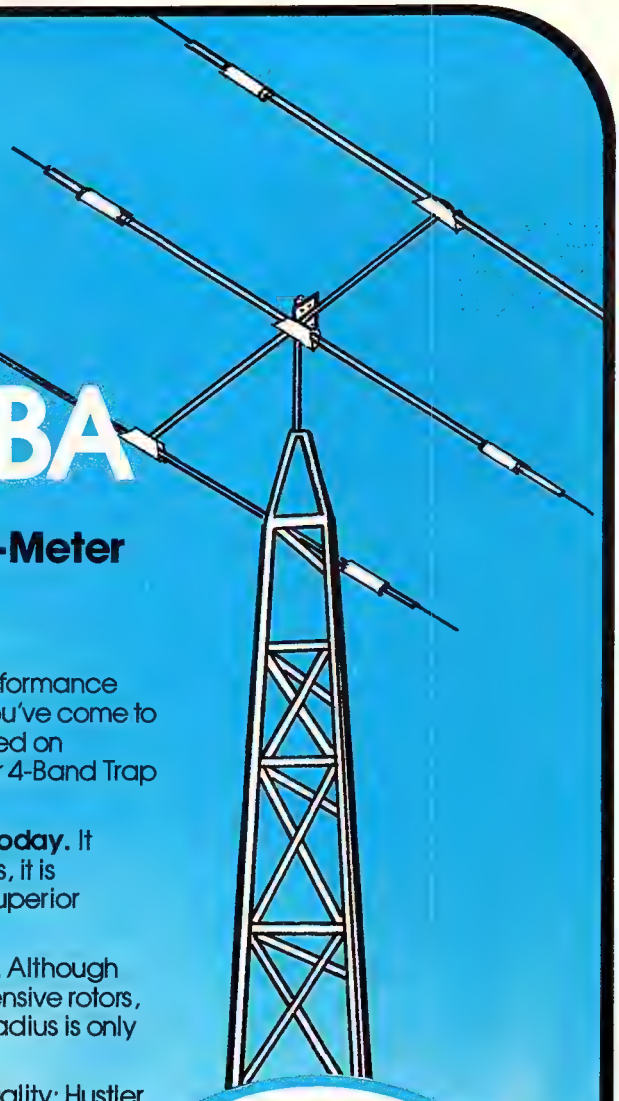

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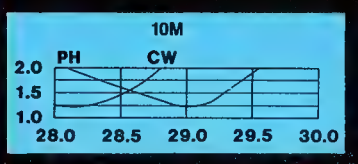

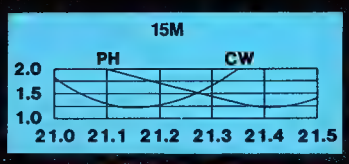

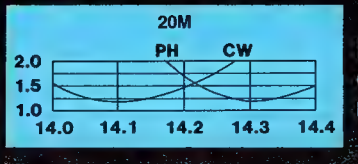

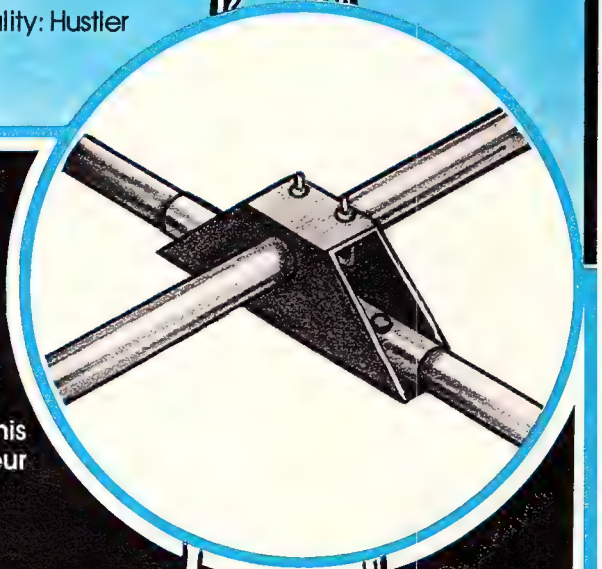

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CQ World-Wide DX Contest
All-Time U.S.A. Records

BY FREDERICK CAPOSSELA, K6SSS

Tabulated below are the record-high scores achieved by U.S. Contesters in the CQ World Wide DX Contest. Number groups following calls and bands are: year of operation, total score, contacts, zones, and countries.

PHONE

Single Operator/Single Band

1.8	K1PBW('76)	7,280	100	10	30
3.5	W1CF('78)	114,227	435	23	80
7.0	KØRF('81)	150,810	474	32	78
14	W4AXE('70) (Opr. WA4PXP)	595,725	1,068	39	156
21	N7DD('81)	923,945	1,998	36	121
28	N7DD('80)	754,536	1,730	36	113

Single Operator/All Band

Station	Band	QSOs	Zones	Countries
	1.8	5	2	3
K1AR	3.5	55	13	33
(1981)	7.0	80	20	50
3,554,880	14.0	487	35	111
	21.0	590	34	107
	28.0	977	36	116
	Total	2,194	140	420

Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	7	5	5
K5GA	3.5	39	15	37
(1978)	7.0	173	21	64
4,150,306	14.0	549	39	125
	21.0	619	35	103
	28.0	1,057	33	111
	Total	2,444	148	445

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	109	8	16
N2AA	3.5	406	24	79
(1979)	7.0	366	28	84
13,299,750	14.0	1,646	40	152
	21.0	2,198	40	144
	28.0	1,354	36	120
	Total	6,079	176	595

CW

Single Operator/Single Band

1.8	K1PBW('76)	22,626	157	15	39
3.5	W1ZM('81) (Opr. K1ZM)	151,497	610	22	71
7.0	KØRF('81)	337,280	949	31	93
14	N7UA('80)	626,400	1,634	34	101
21	K6EWL('81)	454,648	1,140	35	101
28	N4ZC('81)	382,182	1,048	32	99

Single Operator/All Band

Station	Band	QSOs	Zones	Countries
	1.8	8	7	8
K1GQ	3.5	208	18	61
(1981)	7.0	425	24	76
3,276,768	14.0	576	32	85
	21.0	428	31	80
	28.0	473	26	80
	Total	2,111	138	390

Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	17	9	16
N4AR	3.5	67	16	62
(1981)	7.0	461	28	92
4,564,350	14.0	755	34	110
	21.0	499	33	101
	28.0	686	32	97
	Total	2,485	152	478

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	72	14	27
W2PV	3.5	427	18	70
(1981)	7.0	1,101	30	103
10,431,729	14.0	1,389	35	118
	21.0	1,228	35	103
	28.0	1,050	34	106
	Total	5,267	166	527

Club Record: Frankford Radio Club ('79) 173,821,640

Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

It has been proposed by our 160 Meter Contest Director, Don McClenon, N4IN, that a change be made in the scoring of our World-Wide 160 Meter DX Contest.

With the many changes on 160 in recent years, both in the U.S. and overseas, the scoring in our contest has become a bit antiquated, and a change is justified to bring it up to date. Don has proposed the following: Contacts between stations in own country, 2 points. Between stations in another country but the same continent, 5 points. Between stations in another continent, 10 points.

The multiplier would remain as is, each state, Canadian province, DX country.

This should make the scoring more equitable world wide. The Europeans stand to gain by this change, but stateside will have a slight reduction in their scores. The losers will be stations in the Caribbean areas, but they will still have the advantage of all those 5 pointers north of them.

There will still be some inequities, but keep in mind that this is a world-wide contest and making it equal for everybody would create very complicated scoring. We would like to have your opinions and suggestions before we put this in effect for the 1983 contest.

There is still no Trophy for the World Top score in the Phone Contest. Any donors? *(Please contact me, W1WY.)*

It is our sad duty to report another Silent Key, Mr. 160, Charles M. O'Brien, W2EQS/W9NFC, on June 13th. Charlie was associated with our 160 C.W. Contest from its inception back in 1960, and continued as its Director until 1974 when he became W9NFC. In later years Charlie's only interest was 160, and he was one of the elite few who made DXCC on the Top Band. May he rest in peace.

A final reminder: Deadline for material for the January issue is October 15th and November 15th for the February issue. And *please* send it to my home address.

73 for this time, Frank, W1WY

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

	Oct.	2-3	California QSO Party
	Oct.	2-3	VK/ZL/Oceania Phone Contest
	Oct.	2-4	SWOT Open QSO Party
	Oct.	9-10	VK/ZL/Oceania C.W. Contest
	Oct.	9-10	GARTG SSTV Contest
	Oct.	10	RSGB 21/28 MHz Phone
	Oct.	9-11	SWOT Open QSO Party
	Oct.	9-11	Rhode Island QSO Party
	Oct.	16-17	Boy Scouts Jamboree
	Oct.	16-17	Pennsylvania QSO Party
	Oct.	16-17	CLARA AC-DC Contest
	Oct.	16-17	ARCI QRP C.W. Contest
†	Oct.	16-17	WA-Y2 DX Contest
	Oct.	17	RSGB 21 MHz C.W. Contest
	Oct.	20-21	YLRL Anniv. C.W. Contest
	Oct.	23-24	Maryland/D.C. QSO Party
	Oct.	**30-31**	**CQ WW DX Phone Contest**
	Nov.	3-4	YLRL Anniv. Phone Contest
	Nov.	6-7	ARRL C.W. Sweepstakes
	Nov.	7	Czechoslovakian Contest
	Nov.	13-14	European RTTY Contest
	Nov.	20-21	ARRL Phone Sweepstakes
	Nov.	**27-28**	**CQ WW DX C.W. Contest**
	Dec.	4-5	ARRL 160 Meter Contest
	Dec.	11-12	ARRL 10 Meter Contest

† *Not official.*

CQ World Wide DX Contest

Phone: Oct. 30–31 C.W.: Nov. 27–28
Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

Complete rules were in last month's issue. Basically, they are the same as they have been for many years, so it would serve little purpose to review them again.

There are some minor modifications in paragraphs VIII, IX, and XIII. Awards will now be made to each call area in Japan. The African and a portion of the Carib./C.A. trophies are available to all comers. The disqualification clause has been rewritten and now clearly states the penalties. I suggest you read the rules again. I reviewed them last month.

Mailing deadline for the Phone entries is December 1st, and this year they go to Bob Cox, K3EST, 6548 Spring Valley Drive, Alexandria, VA 22312. They can also go to our home office, CQ magazine, 76 N. Broadway, Hicksville, NY 11801.

California QSO Party

1600–2159Z, Sat./Sun., Oct. 2–3

This year's party is again sponsored by the Northern California Contest Club.

Operating time is limited to 24 out of the 30 hour contest time for single operator stations. Off times must be clearly indicated on the log and must be at least 15 minutes long. Multi-operator stations may use the full 30 hours.

The same station may be worked once per band, per mode, simplex only. CA mobiles that change counties are considered new stations.

Exchange: QSO no. and QTH. County for CA stations; state, province, or DX country for others.

Scoring: Two points for phone contacts, 3 points for c.w. QSOs.

The multiplier for CA is the number of states (50) and VE call areas (8) worked. Out-of-state stations use CA counties (maximum of 58 possible).

Frequencies: C.W.—1805, 3560, 7060, 14060, 21060, 28060. S.S.B.—1815, 3895, 7230, 14280, 21365, 28560. Novice—3725, 7125, 21125, 28125. Try c.w. on the half hour, 160 at 0500Z.

Awards: Certificates to the highest scorers in each CA county; in each state, VE province, and DX country; and to each station scoring 100 or more QSOs. Trophies to the top scoring single operator in CA and out-of-state station, and the highest scoring expedition to a CA county.

Indicate each new multiplier on your log as it is worked. Include a summary sheet showing the scoring and other information. A large s.a.s.e. will get you a copy of the results.

Mailing deadline is November 1st to NCCC, c/o Kip Edwards, W6SZN, 1928 Hillman Ave., Belmont, CA 94002.

Side Winders on Two QSO Party

Sat.–Mon., Oct. 2–4 and Oct. 9–11
0000 to 0600 UTC both weekends

This is the 5th QSO Party for the SWOT A.R.C. open to all licensed amateurs.

Single operator only, phone or c.w., no repeaters. A station is counted once only and must be made from one geographic location. Mobiles operating from more than one county must submit their highest score.

Exchange: Call, RS(T), ARRL section, and county (or equivalent). Members will also include their membership number.

Scoring: Contacts with a SWOT member count 2 points; all others 1 point. Multiply total by number of different counties worked.

There was no mention of any awards, but you can build up your county total.

It is not necessary to submit a log, but be prepared to send one if requested. However, your entry should include a detailed summary with the following information: Name, call, address, ARRL section, SWOT number, number of SWOT contacts, number of non-member contacts, total counties, and final score.

Mailing deadline is November 1st to Jerome Doerrie, K5IS, Rt. 2 Box 72, Booker, TX 79005.

Inquiries about membership should be sent to George Bretz, KB5SV, 3530 Livingston, Ft. Worth, TX 76110.

VK/ZL/Oceania DX Contest

Phone: Oct. 2–3 C.W.: Oct. 9–10
1000 GMT Sat. to 1000 GMT Sun.

Stations in the rest of the world will be concentrating on working stations in Oceania with emphasis on VK/ZL for their multiplier.

The following rules apply to areas other than VK/ZL.

Exchange: RS(T) plus a progressive QSO number starting with 001.

Scoring: Two points for each VK/ZL contact; 1 point for contacts with other Oceania areas.

Final Score: Total QSO points from all bands multiplied by the sum of VK/ZL call areas worked on each band. (Single band logs also accepted.)

Awards: Attractive colored certificates to the top all-band scorers, both phone and c.w., in each country and each call area of Japan, U.S.A., and U.S.S.R. Additional awards if returns warrant.

Logs: Date/time in GMT, station worked, number sent/rec'd, band, and QSO points. Underline each new VK/ZL call area worked on each band. Use a separate sheet for each band. Include a summary sheet showing the scoring, name and address in block letters, and a signed declaration that all rules and regulations have been observed.

S.W.L. Section: Log VK and ZL stations only. Include call of station being worked and RS(T) and serial number of VK/ZL station being logged. Log and scoring same as indicated for the transmitting stations. Phone and c.w. scores are combined for the final score.

Logs must be in the hands of the Committee by January 31, 1983. This year they go to NZART Contest Mgr. ZL2GX, 152 Lytton Road, Gisborne, New Zealand.

RSGB 21/28 MHz SSB Contest

0700 to 1900 GMT Sunday, October 10

It's the world working the British Isles on 21 and 28 MHz in this one. There are seven countries in the British Isles: G, GD, GI, GJ, GM, GU, and GW. There is a total of 42 prefixes when the numerals are included (G2, GD3, GI4, etc.).

The same station may be worked on each band for QSO and multiplier credit. Both single and multi-operator (multi must use both bands).

Following are the rules for areas other than the British Isles.

Exchange: The RS report plus a progressive contact number starting with 001.

Scoring: Each contact with a B.I. station is worth 3 points. Multiply total QSO points from each band by the sum of prefixes worked on each band (maximum of 42 per band). The GB prefix does not count for QSO or multiplier.

Unmarked duplicate contacts will be penalized 10 times the points claimed. Logs containing more than 5 unmarked duplicates will be disqualified.

There is also an s.w.l. section. Only British Isles stations are to be logged. Scoring is the same as indicated above.

Note: In the column headed "station being worked," the same callsign may only appear once in every five contacts except when the logged station is a new multiplier for the receiving station.

Awards: There are two trophies for the British. Overseas stations will be awarded certificates to the winners in each continent.

Separate logs are required for each band. Include a summary sheet showing the scoring, a list of prefixes worked, and a signed declaration that rules and regulations have been observed, plus your name and address in block letters.

Logs from overseas must be received by December 1st. This year they go to RSGB HF Contest Committee, c/o Dr. E.J. Allaway, G3FKM, 10 Knightlow Road, Birmingham B17 8QB, England.

There were 44 overseas entries in last year's 21/28 MHz SSB Contest, of which 7 were from the U.S. and Canada. They finished in this order: VE1CEG, AE4Y, KN2N, N2LT, KA1UE, WA4VEK, and W4KO. VE1CEG was 3rd world high, and according to last year's rules should be a certificate winner. (This year's awards are made on a continental basis.)

RSGB 21 MHz CW Contest

0700 to 1900 GMT Sunday, October 17

Like the 21/28 MHz SSB Contest, activity in this one is between the British Isles and the rest of the world.

Competition is limited to single operator stations only. There is a separate section for QRP in which power input must not exceed 10 watts.

The following rules are for areas other than the British Isles.

Exchange: RST report plus a progressive QSO number starting with 001.

Scoring: Each contact with a British Isles station is worth 3 points. Multiply total QSO points by the number of B.I. prefixes worked—G2, G3, GD3, etc., a maximum of 42 possible. (GB does not count for QSO or multiplier.)

Unmarked duplicate contacts for which credit has been taken will be penalized 10 times the points claimed. Logs containing more than 5 unmarked duplicates will be disqualified.

Awards: Certificates to the 1st, 2nd, and 3rd place winners in the British Isles and to leaders in each overseas continent.

Include a summary sheet with a list of prefixes worked, station description, the usual signed declaration, and your name and address in block letters.

Logs from overseas must be received no later than December 31st. This year they go to Mr. J. Bazley, G3HCT, Brooklands, Ullenhall, Solihull, Warwickshire, B95 5NW, England.

The 21 MHz 1981 CW Contest had a much better turnout, 116 entries, but only 4 were from this side of the pond. They finished in this order: K2PZ, VO1AW, W1CNU, and W1OPJ, none of which qualified as certificate winners under last year's rules. K2PZ placed #23 world wide. (Awards will also be made on a continental basis for this contest.)

GARTG SSTV Contest

0600 to 0600 UTC, Sat.–Sun., Oct. 9–10

This is the third world-wide SSTV contest sponsored by the German Amateur Radio Teleprinter Group.

Use all bands, 3.5 through 28 MHz, in that portion of the band reserved for SSTV. A 6 hour off time must be taken at any time during the contest.

Exchange: Call sign, RST, message number (001, etc.). GARTG members will also include their membership number. Exchange must be made exclusively in the SSTV mode.

Scoring: Contacts on 80, 40, and 20 meters, 1 point; on 15 meters, 2 points; and on 10 meters, 5 points. Add 50 bonus points for each contact with a GARTG member station. Same station may be worked on each band.

Multiplier: Each country (WAE and ARRL list) and each call area in JA, PY, VE/VO, VK, W/K worked on each band.

Final Score: QSO points × countries × continents plus bonus points.

There is also an s.w.l. division with the same scoring as outlined above. S.w.l. logs must contain both the report sent and received by the station logged.

Awards: Free 1 year subscription to "RTTY," official organ of the GARTG, to the 3 top scorers.

Use a separate log sheet for each band and a summary sheet showing the scoring, etc.

All entries must be received by December 10th and go to Contest Manager, Wolfgang Punjer, DL8VX, P.O. Box 90 11 30, D-2100 Hamburg 90, Fed. Rep. of Germany.

Rhode Island QSO Party

1700 to 0500 GMT Sat.–Sun., Oct. 9–10
1300 to 0100 GMT Sun.–Mon., Oct.10–11

This one is sponsored by the East Bay A.W.A. The same station may be worked on each band and on each mode. R.I. stations may contact other in-state stations for QSO points.

Exchange: RS(T) and QTH. City or town for R.I.; state, province, or country for others.

Scoring: Phone contacts are worth 2 points, C.W. 3 points, and Novice/Tech. 5 points.

R.I. stations multiply total QSO points by the number of states, VE provinces, and DX countries worked. Others by the number of different R.I. cities and towns worked for their final score. (There are 39 cities and towns in R.I.)

Frequencies: C.W.—1810, 3550, 3710, 7050, 7110, 14050, 21050, 21110, 28050, 28110. Phone—3900, 7260, 14300, 21360, 28600, 50.110, 144.2, and 146.52. Use of FM simplex encouraged. (No repeaters.)

Awards: Certificates to top scoring stations in each R.I. county, and each state, province, and country. Also to the winning Novice and Technician in R.I. and out of state. And to the club in each state, province, and country with the highest aggregate score (minimum of 3 logs per club).

Include a summary sheet showing the scoring the other essential information, and an s.a.s.e. for a copy of the results.

Mailing deadline is November 15th to East Bay A.W.A., P.O. Box 392, Warren, RI 02885.

Scouts Jamboree On The Air

Starts: 0001 Local Time Sat., Oct. 16
Ends: 2359 Local Time Sun., Oct. 17

This is the 25th annual Jamboree sponsored by the World Bureau of Scouts celebrating the 75th anniversary of its founding. Activity is world wide and includes not only Scout units, but Girl Scouts and Guides, too.

This is not a contest, but an opportunity for Scouts or anyone interested in Scouting to get together on the air and exchange greetings.

Amateurs can invite members of Scout units or individuals to visit their stations or clubs and see how ham radio operates. If you do not know any radio amateurs, write to: ARRL, Att: Carol Colvin, AJ2I, 225 Main Street, Newington, CT 06111, and Carol will help you find a nearby ham (include an s.a.s.e.).

No specific exchange, no scoring, and no logs are required. However, participating post-card-size certificates issued by the World Scout Bureau are available from the JOTA Coordinator, W2GND/K2BSA. They may be requested before the JOTA weekend for distribution and included with your QSL's of JOTA contacts. Send a large s.a.s.e. to W2GND; 20¢ postage for 8 cards, 17¢ for each additional 8.

Suggested Frequencies: Phone—3940, 7240, 14290, 21360, 51150. C.W.—3590, 7030, 14070, 21140, 28190. Also Novice bands, SSTV, and RTTY.

There is also a QSL card contest. Suggest you write to W2GND for additional details. Stateside participants send reports to Harry A. Harchar, W2GND, 216 Maxwell Ave., Hightstown, NJ 08520.

Pennsylvania QSO Party

1700–0400Z Sat.–Sun., Oct. 16–17
1300 –2200Z Sun., Oct. 17

This is the 25th annual party sponsored by the Nittany A.R.C. of State College, PA. The same station may be worked on each band and mode for QSO points. Penn. stations may also work other Penn. stations for QSO and multiplier credit. Mobiles may be worked in each county change.

Exchange: RS(T), 3 digit QSO number, and QTH. County for Penn.; ARRL section for others.

Scoring: One point for s.s.b. contacts, 1.5 points for c.w., 2 points for c.w. on 80.

Penn. stations multiply total by ARRL sections + Penn. counties + 1 DX country worked. Others use Penn. counties for their multiplier (maximum of 67).

Penn. mobiles calculate their total score from each county and add totals for their final score. Stations on county lines will give out one number, but the two counties count as separate multipliers.

Frequencies: C.W.—40 kHz up from bottom of each c.w. band. S.S.B.—3980, 7280, 14280, 21380, 28580. Novice—10 kHz from bottom of each Novice band.

Awards: Certificates to section winners and to the top 10 Penn. stations (minimum of 10 QSO's). Plaques to winners in both eastern and western Penn., out of state and mobile stations, and multi-operator entry. (Top club?)

Include a summary sheet with your entry showing the scoring, check list of counties or sections worked, and any interesting comments. A dupe sheet is required if you make 100 or more contacts. Also, enclose 37¢ in stamps for a copy of the results.

Mailing deadline is November 15th to Douglas R. Maddox, W3HDH, 1187 S. Garner Street, State College, PA 16801.

C.L.A.R.A. AC/DC Contest

Starts: 1800Z Sat. October 16
Ends: 1800Z Sun. Oct. 17

Sponsored by the Canadian Ladies Amateur Radio Assoc., this contest is open to both YL's and OM's.

Each station may be worked twice, once on c.w. and once on phone, or on two different bands, c.w. or phone.

Exchange: RS(T), QTH, name, and call.

Scoring: For CLARA members, 1 point per QSO, (YL or OM) 3 points for each contact with a bonus station. (YL's will identify if they are a bonus station.)

Non-members work YL stations only. Scoring same as above.

Multiply total QSO points by number of Canadian provinces/territories worked.

Frequencies: Phone—3775, 3900, 7150, 14160, 14280, 21300, 28488, 28588. C.W.—3690, 7035, 14035, 21035, 28035.

Awards: CLARA winners, first place, CLARA pin and certificate. Second and third place winners a certificate. Non-member winners, first place, plaque and certificate. Second and third place certificates (YL or OM). All entries are eligible for a mini prize drawing.

Mailing deadline for logs is December

31st to Lynn Boothroyd, VE3LQL, 673 Tackaberry Dr., North Bay, Ontario, Canada P1B 8R1.

ARCI QRP C.W. Contest

Starts: 1200Z Sat., October 16
Ends: 2400Z Sun., October 17

This is the Fall edition and 21st anniversary of the QRP Amateur Radio Club International. The contest is open to members and non-members. Participants may operate a maximum of 24 hours.

Exchange: RST and state, province, or country. Members will include their number; non-members their power output.

Scoring: Contacts with a member count 5 points, with a non-member 2 points, with stations other than W/VE 4 points, with Novice/Techs. 3 points.

The same station may be worked on each band for QSO and multiplier credit.

There is a power multiplier:
4 to 5 watts output— × 2.
3 to 4 watts output— × 4.
2 to 3 watts output— × 6.
1 to 2 watts output— × 8.
Less than 1 watt— × 10.

The following bonus multipliers are also available: × 2 is using solar or wind power, × 1.5 for battery power. Must be used for duration of contest.

Final Score: Total per band score. QSO points × (states + provinces + countries) × power multiplier × bonus multiplier if any. Add totals from each band worked for final score.

Frequencies: 1810, 3560, 7040, 14060, 21060, 28060, 50360. Novice—3710, 7110, 21110, 28110. VHF/UHF contacts must be made direct.

Awards: Certificates to the highest scoring stations in each state, province, and country, and to the top overall Novice or Tech.

Use a separate log sheet for each band. Include a summary sheet showing the scoring, equipment description, and other essential information, and a large s.a.s.e. for copy of the results.

Logs must be received by November 20th and go to William Dickerson, WA2JOC, 352 Crampton Dr., Monroe, MI 48161.

WA-Y2 DX Contest

Starts: 1500Z Sat., October 16
Ends: 1500Z Sun., October 17

This activity is usually held the third full weekend of October each year to commemorate the anniversary of the founding of the German Democratic Republic.

Use of all bands, 3.5 through 28 MHz, both phone and c.w. However, the first 10 and last 25 kHz of all bands are to be kept free of contest operation.

The same station may be worked once on each band and each mode for QSO and multiplier credit.

There are three classes: single operator, multi-operator, and s.w.l.

Exchange: RS(T) plus a 3 figure QSO number starting with 001. The Y2 stations will also include 2 figures identifying their district (Kreiskenner).

Scoring: Each Y2-Y9 contacted is worth 3 points.

Multiplier: Number of different districts worked on each band (maximum of 15 per band). A district is identified by the last letter in the call, A through O, not by the number in the call.

Final Score: Sum of QSO points multiplied by sum of different districts worked on each band.

S.w.l.'s get one point for each Y2-Y9 reported, including the RS(T), district, and call of station being worked. Rest of scoring same as above.

Awards: Certificates to the top scoring stations in each section of each country.

Use a separate log sheet for each band and include a summary sheet showing the scoring, a list of districts worked, the usual signed declaration that all rules and regulations were observed, and your name and address in block letters.

Entries must be postmarked no later than 30 days after the contest. They go to Y2 Contest Bureau, RKDDR, Hosemannstr. 14, DDR 1055 Berlin, German Democratic Republic.

YLRL Anniversary Party

C.W.: Oct. 20–21 Phone: Nov. 3–4
1800 to 1800 GMT Wed./Thurs.

This is the 43rd annual party run by the YL Radio League, and it is open to all YL's around the world.

All bands may be used. Phone and c.w. are separate contests and require separate logs.

Exchange: QSO no., RS(T), and ARRL section. DX stations indicate country.

Scoring: One point per QSO between stations within an ARRL section and between DX stations. Two points if QSO is between a DX and ARRL section station. The same station may be worked once only regardless of the band.

Multiplier: Is derived from the number of ARRL sections and DX countries worked. There is also a low power multiplier of 1.25 if power input is 150 watts or less on c.w., 300 watts p.e.p. on s.s.b.

Final Score: Total QSO points times ARRL sections and DX countries worked, times the power multiplier.

For each duplicate contact that is removed from the log in the course of checking, a penalty of 3 additional and equal contacts will be exacted.

Awards: Only YLRL members are eligible for the Cup and the Corcoran and Hager Awards. Non-members will receive certificates.

Logs must be postmarked no later than November 14 and received by December 15th. This year they go to Sandi Heyn, WA6WZN, 962 Cheyenne St., Costa Mesa, CA 92626.

1981 VK/ZL Contest Results

C.W.

U.S.A.		
W0KEA	AB	12,396
W1EVT	"	10,793
AI9J	"	8,064
W8UVZ	"	7,747
WB4RUA	"	5,280
K9PQG	"	5,148
N2LT	"	4,582
K9GM	"	4,088
W5OB	"	3,416
K9AB	"	2,992
W6MYP	"	1,600
AI6Z	"	1,600
W6NNV	"	1,440
W1END	"	1,280
K2LP	"	988
W3ARK	"	728
AA6EE	"	702
W3TV	"	480
W9QWM	"	440
N0CKC	"	240
WA0TKJ	10	280
Canada		
VO1AW	AB	154
VE7BS	40	540
Panama		
HP1AC	AB	912
Columbia		
K3ZO/HK3	AB	884
Argentina		
LU1EWL	AB	40

S.S.B.

U.S.A.		
W0KEA	AB	22,211
AI9J	"	16,531
K6BPY	"	11,565
WB9MSV	"	3,676
K8CFU/4	"	3,510
N2LT	"	3,063
N4MM	"	2,600
LU3YL/W4	"	2,244
K9AB	"	1,170
W4PTT	"	1,036
K3ND	"	900
W8UVZ	"	648
W3ARK	"	594
W3ICM	"	154
K8VIR	20	2,160
KF1B	"	60
W9QWM	10	238
KD4PP	"	140
Canada		
VE7WJ	AB	3,902
VO1AW	20	40
Columbia		
K3ZO/HK3	AB	1,892

Winners are not indicated, but according to the rules, the leaders in each call area should receive a certificate.

Maryland/D.C. QSO Party

1800Z Sat. to 2100Z Sun., Oct. 23–24

This year's party is once again being sponsored by the Columbia A.R.A. of Maryland.

The same station may be worked on each band and mode for QSO credit, and MD/DC stations can work other in-state stations.

Exchange: QSO no., RS(T), and QTH. County for MD/DC; state, province, or country for others. (Baltimore and Wash. are independent cities.)

Scoring: MD/DC stations multiply total QSO's by sum of MD counties, states, provinces, and DX countries worked. Others multiply total MD/DC QSO's by MD counties and independent cities worked (maximum of 25).

Multiply your final score by 1.5 if you run 200 watts or less.

Frequencies: C.W.—60 kHz up from low end of band. Phone—3950, 7250, 14290, 21390, 28590. Novice—3720, 7120, 21120, 28120.

Awards: Certificates to winners in each category.

Dupe sheets are required for entries with over 200 contacts. Maintain a continuous log for phone and c.w., and indicate which category on your entry—phone, c.w., or mixed mode—you are entering.

Mailing deadline is November 30th to Columbia A.R.A., Att: Robert K. Nauman, WA3VUQ, 4017 Font Hill Drive, Ellicott City, MD 21043.

Propagation

a monthly feature by
GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

DX Contest Special

The 1982 *CQ* World Wide DX Contest will be held on the following dates:

Phone Section: 0000 GMT Sat., Oct. 30–2400 GMT Sun., Oct. 31
C.W. Section: 0000 GMT Sat., Nov. 27–2400 GMT Sun., Nov. 28

For the 32nd consecutive year, this month's Propagation column is devoted to a special, comprehensive forecast for use during the Contest sections, both Phone and C.W.

Looks Great for the Contest

Unless nature plays a last-minute trick in the form of a radio storm, this should be another *great* Contest period. Sunspot activity, while on the decrease, is expected to be in the 115 range. While this is lower than the levels observed during the 1979–81 Contest periods, it is still in the exceptionally high range. Because of the non-linearity of the ionosphere during exceptionally high periods of solar activity, conditions on the h.f. bands this year should be quite similar to those observed during the Contest periods of the past four years. In short, barring the development of a radio storm, get ready for another exciting DX contest.

Solar Cycle Progress

The Royal Observatory of Belgium, the world's official keeper of sunspot numbers, reports a monthly mean sunspot number of 110.4 for June 1982. This results in a 12-month running smoothed sunspot number of 138, centered on December 1982. This is a decline of one unit from November's reading. The sunspot cycle is measured by the value of smoothed sunspot number.

Band-by-Band Conditions

The following is a band-by-band summary of DX propagation conditions expected on each amateur h.f. band from mid-October through mid-December, and centered on the 1982 Phone and C.W. Contest periods. For a more detailed circuit-by-circuit forecast, refer to the DX Propagation Charts appearing on the following pages.

10 meters: Good, solid openings should be possible to just about every corner of the world during the daylight hours, and the band may remain open to southern and tropical areas into the early evening. DX openings should begin an hour or so after sunrise, towards Europe, Africa, and the east, as well as in a southerly direction towards the Caribbean and Central and South America. Signals should peak in intensity towards Europe and the east an hour or so before Noon, towards Africa about an hour or so after Noon, and towards the south during the late afternoon. Optimum conditions towards the Far East, Australasia, Southeast Asia, etc., are forecast for the late afternoon and early evening hours. Exceptionally strong signal levels can be expected on many openings, particularly when conditions rise to High or Above Normal.

15 meters: This band should be jumping with signals during most of the daylight hours. Excellent propagation conditions are expected from shortly after sunrise through the early evening hours. The band could remain open well into the evening towards southern and tropical areas. Peak openings should occur towards a specific geographical area about an hour or so after the peak has occurred to the same area on *10* meters. Openings are expected to all areas of the world, and exceptionally strong signals should be possible most of the time. *Fifteen* meters is likely to be the *best* DX band during the daytime hours, but at times it will be a toss-up with *10* meters.

20 meters: Expect good-to-excellent DX openings almost around the clock. Signals should peak from all directions for about an hour or two after sunrise and again during the late afternoon and early evening. Excellent openings are expected to many southern and tropical areas well into the hours of darkness, and when conditions are High Normal or better, the band should remain open for DX during most of the night. Expect *long-path* openings on this band for about an hour or so after sunrise and again for an hour or so before local sunset. Signal levels are expected to be exceptionally strong during peak propagation periods on *20* meters. This should be the band that will produce the longest period for DX openings, the strongest signals, and openings to more areas of the world than any other single band during the Contest periods.

40 meters: This should be a prime DX band during the hours of darkness as summer static fades into oblivion. DX openings should begin during later afternoon, continue through the hours of darkness, and last until an hour or two after sunrise. The band should open first for DX towards Europe and the east during the late afternoon. Signals should increase in intensity as darkness approaches. During the hours of darkness expect good DX openings to most areas of the world. Signals should peak from an easterly direction about midnight, and from a westerly direction just after sunrise. Excellent openings towards the south should be possible throughout most of the nighttime period. *Forty* meters is likely to be the best band for DX during the hours of darkness, although at times it may be nip and tuck with *20* meters for this honor.

80 meters: While not quite as good a nighttime band as *40* meters, expect some good DX openings on this band to many areas of the world during the hours of darkness. The band will open later, close earlier, and be somewhat noisier than *40* meters. Signals should peak towards Europe and the east around midnight, and towards the west just before

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for October 1982

Propagation Index	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 10, 20-21, 28	A	A	B	C
High Normal: 7-8, 14, 17, 19	A	B	C	C-D
Low Normal: 4-6, 9, 11-13, 16, 18, 22-24, 26-27, 31	A-B	B-C	C-D	D-E
Below Normal: 2-3, 15, 25, 29-30	B-C	C-D	D-E	E
Disturbed: 1	C-E	D-E	E	E

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9 + 30 dB.**

B—Good opening, moderately strong signals varying between S9 and S9 + 30 dB, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. **Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.**
2. **With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be poor to blackout (D-E) on Oct. 1st, fair-to poor (C-D) on the 2nd and 3rd, good-to-fair (B-C) from the 4th through the 6th, etc. Some radio storminess is expected during a part of the Contest period (Oct. 30–31), with conditions varying between low and below normal.**

For updated information, subscribe to bi-weekly MAIL-A-PROP, David D. Meisel, Editor, 54 Westview Crescent, Geneseo, NY 14454.

11307 Clara St., Silver Spring, MD 20902

sunrise. Expect good openings towards the south throughout most of the night.

160 meters: Considerably decreased static levels and longer hours of darkness in the Northern Hemisphere should welcome back DX openings in this band during the hours of darkness and into the sunrise period. Because of relatively high signal absorption and the lower power levels used in this band, openings will often be weak and noisy, but some fairly good ones should be possible. Best bets are for openings towards Europe and towards the Caribbean and Latin America from the eastern half of the country, and towards the Far East, Australasia, the South Pacific, and Latin America from the western half of the country. DX openings to other areas of the world may also be possible. The best propagation aid for this band (and for *40* and *80* meters as well) is a set of sunrise and sunset tables, since DX signals tend to peak when it is *local sunrise* at the *easternmost* point of a path.

Contest Work Charts

The DX Propagation Charts on the following pages show the times when each amateur band from *6* through *160* meters is expected to open from each time zone area in the continental USA to the major DX areas of the world. The information contained in the charts, while useful during the Contest period in their present format, can easily be reorganized into more convenient formats to meet specific operational work plans or schedules. Experience gained during previous Contests has shown that specifically tailored schedules derived from the charts can be extremely useful in piling up contacts and points with a minimum of wasted time.

The following is an example of one of several types of plans that can be devised. It is a *multi-band* operational work plan, which shows the times and bands when propagation conditions are expected to be optimum to various areas of the world for each two-hour period throughout the day. An Eastern QTH has been chosen for this example, but similar plans can be devised for Central and Western locations.

Time EST	Optimum Band (Meters)	Areas To Which Band Is Expected To Be Open
00–02	40	Most of Europe, Eastern Mediterranean, and Middle East. Most of Central and South America. A few African areas and possibly Antarctica.
02–04	20	Some South Pacific, New Zealand, and Australasia. A few Far East and Asian areas. Some South America and Antarctica.
04–06	40	South Pacific, New Zealand, Australasia. Many South American areas. A few Far Eastern and Asian areas. Possibly Antarctica.
06–08	20	Most of Europe. South Pacific, New Zealand, and Australasia. Most of Central and South America. A few African areas. Some Far East and Asian areas.
08–10	15	All of Europe, Eastern Mediterranean, and Middle East. Some of Africa. Most of Central and South America. South Pacific, New Zealand, and Australasia. A few Asian areas.
10–12	10	Most of Europe and Africa. Most of Central and South America. A few Asian areas, New Zealand, South Pacific, and Australasia.
12–14	15	Some of Europe and most of Africa. Most of Central and South America. A few areas of South Pacific, New Zealand, and Australasia.
14–16	15	Most of Africa, and Central and South America. Some of South Pacific, New Zealand, and Australasia. A few Asian areas.
16–18	20	Most of Europe, Eastern Mediterranean, and the Middle East. All of Africa, and Central and South America. A few Australasian areas.
18–20	15	Lots of South Pacific, New Zealand, and Australasia. Some of Far East and Asia. Most of Central and South America. Possibly Antarctica.
20–22	20	Most of Africa, Far East, South Pacific, New Zealand, Australasia, Central and South America. A few European areas and Middle East. Some Antarctica.
22–00	20	Lots of Far East, South Pacific, New Zealand, Australasia, Central and South America. A few African and Asian areas. Antarctica.

**Similar work plans can be devised for single-band operation or for openings to specific DX areas.*

*Table I– Sample multi-band work plan for Eastern USA QTH.**

Radio Storm

If Mother Nature should play a trick and produce a radio storm during the Contest periods, expect conditions to drop to Below Normal or Disturbed to many areas of the world, depending upon the storm's severity. The storm's influence will generally extend outwards from the polar regions, the more severe the storm becomes. Under storm conditions, expect considerably fewer openings on *10, 15,* and *20* meters, with weaker signals, increased fading, flutter fading, and higher noise levels. Paths passing through the polar regions and the upper latitudes are often more adversely affected than signals coming from mid and lower latitudes.

Conditions on *40, 80,* and *160* meters are likely to become erratic as well. During certain types of storms, conditions may actually improve at times for openings on all bands towards southern and tropical areas, and on *40, 80,* and *160* meters during the hours of darkness.

If a radio storm should develop, concentrate on working trans-polar paths on *10, 15,* and *20* meters during the daylight hours. Check the *40, 80,* and *160* meter bands for possible openings to some areas of the world during the hours of darkness.

A Last Minute Forecast made at press time for the Phone section of the Contest appears at the beginning of this column. A similar forecast for the C.W. section will appear in next month's column. For updated geomagnetic and solar data during the Contest period, check the National Bureau of Standards Radio Station WWV broadcasts at 18 minutes past each hour. These broadcasts (transmitted simultaneously on 2.5, 5.0, 10.0, 15.0, and 20.0 MHz) contain the latest available geomagnetic K-figure and the level of 10.7 cm solar flux. They also contain a short-term forecast of geomagnetic and solar conditions given in subjective terms. Fig. 1 can be used to convert the geomagnetic and solar data given on the WWV broadcasts into expected h.f. ionospheric conditions. The hourly forecasts broadcast on WWV, along with the latest solar flux and geomagnetic indices, also may be obtained by telephoning 303-497-3235 at any time. This is a service provided by the NOAA Space Environment Services Center, but the call is not toll-free. Direct inquiries to the duty forecaster at the Center can also be made 24 hours each day, 7 days a week by calling 303-497-3171 (collect calls will not be accepted).

Updated day-to-day forecasts for the h.f. bands, made three weeks in advance, can be obtained through the MAIL-A-PROP subscriber service. For further information and subscription fees contact MAIL-A-PROP, Dr. David D. Meisel, 54 Westview Crescent, Geneseo, NY 14454.

V.H.F. Ionospheric Propagation

October looks like a good month for ionospheric propagation on the v.h.f. bands. The continuing high level of solar activity, along with seasonal changes in the ionosphere, should produce some fairly good DX openings on the *6* meter band during the daylight hours. The best times for such openings, and the areas of the world to which they may be possible, are shown in the accompanying DX Propagation Charts with a **. Generally speaking, openings from the eastern half of the country towards Europe and Africa may be possible before noon. The best chance for *6* meter openings towards the Caribbean and Central and South America from all areas of the USA should be from

October 15 - December 15, 1982
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Central Europe & North Africa	06-07 (1) 07-08 (3) 08-13 (4)† 13-14 (3) 14-15 (1)	06-07 (1) 07-08 (3) 08-14 (4) 14-16 (3) 16-17 (2) 17-18 (1)	04-06 (2) 06-09 (4) 09-10 (3) 10-14 (2) 14-16 (3) 16-22 (4) 22-00 (3) 00-02 (2) 02-04 (3)	16-17 (1) 17-18 (2) 18-20 (3) 20-01 (4) 01-02 (3) 02-03 (2) 03-04 (1) 19-21 (1)* 21-23 (2)* 23-01 (3)* 01-02 (2)* 02-03 (1)*
Northern Europe & European USSR	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (4)† 11-12 (3) 12-13 (2) 13-14 (1)	06-07 (1) 07-09 (3) 09-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	04-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-17 (3) 17-20 (4) 20-22 (3) 22-00 (2) 00-02 (3) 02-04 (2)	17-19 (1) 19-02 (2) 02-04 (1) 20-03 (1)*
Eastern Mediterranean & Middle East	07-08 (1) 08-09 (3) 09-13 (4)† 13-14 (3) 14-15 (1)	06-07 (1) 07-08 (3) 08-10 (4) 10-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	07-12 (1) 12-15 (2) 15-17 (3) 17-22 (4) 22-00 (3) 00-01 (2) 01-03 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-01 (2) 01-02 (1) 20-00 (1)*
Western Africa	06-07 (1) 07-12 (3)† 12-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	04-06 (1) 06-07 (2) 07-14 (3) 14-20 (4) 20-22 (3) 22-00 (2) 00-01 (1)	03-04 (3) 04-06 (2) 06-13 (1) 13-15 (2) 15-17 (3) 17-03 (4)	18-22 (1) 22-01 (2) 01-03 (1) 00-03 (1)*
Eastern & Central Africa	07-08 (1) 08-09 (2) 09-12 (3)† 12-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (3) 09-13 (2) 13-15 (3) 15-18 (4) 18-19 (3) 19-22 (2) 22-00 (1)	03-05 (2) 05-09 (1) 12-14 (1) 14-16 (2) 16-17 (3) 17-01 (4) 01-03 (3)	19-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)*
Southern Africa	07-08 (1) 08-10 (3)† 10-14 (4) 14-16 (3) 16-17 (2) 17-18 (1)	06-08 (1) 08-11 (2) 11-13 (3) 13-16 (4) 16-18 (3) 18-20 (2) 20-22 (1)	06-09 (1) 11-14 (1) 14-15 (2) 15-17 (3) 17-21 (4) 21-02 (3) 02-05 (2)	18-19 (1) 19-22 (2) 22-23 (1) 19-21 (1)*
Central & South Asia	08-09 (1) 09-10 (2) 10-11 (1) 20-22 (1)	07-08 (1) 08-10 (2) 10-11 (1) 18-20 (1) 20-22 (2) 22-00 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-11 (1) 18-20 (1) 20-21 (2) 21-23 (3) 23-00 (2) 00-01 (1)	18-21 (1) 06-08 (1)
Southeast Asia	10-12 (1) 12-14 (2) 14-15 (1) 17-18 (1) 18-20 (2) 20-21 (1)	09-10 (1) 10-12 (2) 12-13 (1) 17-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	02-06 (1) 06-09 (2) 09-11 (1) 18-21 (2) 21-23 (1)	18-20 (1) 05-07 (1)
Far East	08-10 (1) 16-17 (1) 17-18 (2) 18-20 (3) 20-21 (1)	08-09 (1) 09-11 (2) 11-12 (1) 16-17 (1) 17-18 (2) 18-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	00-04 (2) 04-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 16-18 (1) 18-20 (2) 20-00 (3)	04-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
South Pacific & New Zealand	09-12 (1) 12-14 (2) 14-16 (3) 16-19 (4)† 19-20 (3) 20-21 (2) 21-22 (1)	08-09 (1) 09-11 (2) 11-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-23 (2) 23-00 (1)	13-19 (1) 19-21 (2) 21-22 (3) 22-02 (4) 02-04 (3) 04-07 (2) 07-10 (3) 10-13 (2)	00-02 (1) 02-03 (2) 03-07 (3) 07-08 (2) 08-09 (1) 03-04 (1)* 04-07 (2)* 07-08 (1)*
Australasia	08-09 (1) 09-11 (2) 11-12 (1) 14-16 (1) 16-17 (2) 17-18 (3)† 18-19 (4)† 19-20 (2) 20-21 (1)	07-08 (1) 08-11 (2) 11-16 (1) 16-17 (2) 17-18 (3) 18-20 (4) 20-22 (3) 22-23 (2) 23-00 (1)	07-08 (3) 08-10 (4) 10-11 (3) 11-12 (2) 12-14 (1) 17-19 (2) 21-23 (1) 23-00 (2) 00-01 (3) 01-03 (4) 03-04 (3) 04-07 (2)	03-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
Caribbean, Central America & Northern Countries of South America	07-08 (2) 08-11 (4)† 11-13 (3)† 13-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	06-07 (1) 07-08 (3) 08-11 (4) 11-13 (3) 13-20 (4) 20-21 (3) 21-23 (2) 23-01 (1)	07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-02 (4) 02-03 (3) 03-06 (2) 06-07 (3)	18-19 (1) 19-21 (3) 21-04 (4) 04-06 (2) 06-07 (1) 19-21 (1)* 21-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-07 (1) 07-09 (4) 09-11 (3)† 11-15 (2)† 15-16 (3) 16-19 (4) 19-20 (2) 20-21 (1)	06-07 (1) 07-09 (4) 09-11 (3) 11-15 (2) 15-17 (3) 17-22 (4) 22-23 (3) 23-00 (2) 00-01 (1)	06-08 (2) 08-11 (1) 14-16 (1) 16-17 (2) 17-19 (3) 19-02 (4) 02-03 (3) 03-05 (2) 05-06 (3)	20-23 (1) 23-04 (2) 04-06 (1) 23-04 (1)*
McMurdo Sound Antarctica	15-17 (1) 17-19 (2) 19-20 (1)	15-17 (1) 17-18 (2) 18-21 (3) 21-22 (2) 22-23 (1)	16-18 (1) 18-21 (1) 21-22 (2) 22-03 (3) 03-05 (2) 05-07 (1) 07-09 (2) 09-10 (1)	00-06 (1)

Time Zones: CST & MST
(24-Hour Time)
CENTRAL USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	06-07 (1) 07-08 (3) 08-11 (4)† 11-12 (3) 12-13 (2) 13-14 (1)	06-07 (1) 07-08 (3) 08-12 (4) 12-13 (3) 13-14 (2) 14-15 (1)	03-06 (1) 06-08 (3) 08-12 (2) 12-14 (3) 14-16 (4) 16-18 (3) 18-20 (2) 20-00 (1) 00-03 (2)	17-18 (1) 18-20 (2) 20-23 (3) 23-01 (2) 01-02 (1) 19-20 (1)* 20-23 (2)* 23-00 (1)*
Nothern & Central Europe & European USSR	06-07 (1) 07-08 (2) 08-10 (3)† 10-11 (2) 11-12 (1)	06-07 (1) 07-08 (3) 08-11 (4) 11-12 (3) 12-13 (2) 13-14 (1)	02-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-16 (3) 16-17 (4) 17-19 (3) 19-20 (2) 20-22 (1) 22-02 (2)	18-20 (1) 20-23 (2) 23-01 (1) 20-23 (1)*
Eastern Mediterranean & Middle East	07-08 (1) 08-09 (2) 09-12 (3)† 12-13 (2) 13-14 (1)	06-07 (1) 07-08 (2) 08-11 (3) 11-12 (4) 12-13 (3) 13-14 (2) 14-15 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-13 (2) 13-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-00 (1)	17-19 (1) 19-22 (2) 22-23 (1) 20-22 (1)*
Western Africa	06-07 (1) 07-11 (3)† 11-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	05-06 (1) 06-10 (2) 10-14 (3) 14-18 (4) 18-19 (3) 19-21 (2) 21-22 (1)	05-12 (1) 12-15 (2) 15-17 (3) 17-23 (4) 23-01 (3) 01-05 (2)	17-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Eastern & Central Africa	07-09 (1) 09-11 (2)† 11-15 (3) 15-16 (2) 16-17 (1)	06-07 (1) 07-12 (2) 12-15 (3) 15-17 (4) 17-18 (3) 18-20 (2) 20-21 (1)	06-14 (1) 14-16 (2) 16-19 (3) 19-21 (4) 21-23 (3) 23-00 (2) 00-02 (1)	20-00 (1) 21-23 (1)*
Southern Africa	07-08 (1) 08-09 (2) 09-11 (3)† 11-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	06-07 (1) 07-10 (2) 10-12 (3) 12-15 (4) 15-17 (3) 17-18 (2) 18-20 (1)	06-13 (1) 13-15 (2) 15-17 (3) 17-20 (4) 20-23 (3) 23-02 (2) 02-04 (1)	18-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Central & South Asia	07-08 (1) 08-10 (2) 10-11 (1) 18-19 (1)† 19-21 (2) 21-22 (1)	06-07 (1) 07-10 (2) 10-11 (1) 17-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	04-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 17-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-02 (1) 02-04 (2)	18-20 (1) 06-08 (1)
Southeast Asia	07-08 (1) 08-09 (2) 09-10 (3) 10-11 (2) 11-13 (1) 15-16 (1) 16-19 (2)† 19-20 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-12 (2) 12-13 (1) 16-17 (1) 17-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	06-07 (1) 07-10 (2) 10-12 (1) 18-19 (1) 19-21 (2) 21-23 (1)	04-07 (1)
Far East	15-16 (1) 16-19 (3)† 19-20 (2) 20-21 (1)	08-10 (1) 15-16 (1) 16-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	04-05 (1) 05-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 17-19 (1) 19-20 (2) 20-22 (3) 22-23 (2) 23-00 (1)	02-03 (1) 03-07 (2) 07-09 (1) 03-06 (1)*
South Pacific & New Zealand	09-12 (1) 12-13 (2) 13-15 (3) 15-18 (4)† 18-19 (3) 19-20 (2) 20-21 (1)	08-11 (1) 11-13 (3) 13-16 (2) 16-17 (3) 17-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	11-17 (1) 17-18 (2) 18-20 (3) 20-01 (4) 01-03 (3) 03-07 (2) 07-09 (4) 09-10 (3) 10-11 (2) 11-12 (2)	23-01 (1) 01-02 (2) 02-07 (3) 07-08 (2) 08-09 (1) 00-02 (1)* 02-07 (2)* 07-08 (1)*

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location, The Eastern USA Chart can be used in the 1, 2, 3, 4, 8 KP4, KG4 and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. An * indicates the best time to listen for 160 meter openings.

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

4. Time shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M. etc. Appropriate *standard* time is used, *not* GMT. To convert to GMT, add to the times shown in the appropriate chart 8 hours in PST Zone, 7 hours in MST Zone, 6 hours in CST Zone, and 5 hours in EST Zone. For example, 13 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 04 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts c.w., or 1 kw, p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level for each 10dB loss, it will lower by one level.

6. Propagation data contained in the Charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

	10 Meters	15 Meters	20 Meters	40/80 Meters
Australasia	08-09 (1) 09-11 (2) 11-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	06-08 (1) 08-09 (3) 09-11 (2) 11-12 (1) 16-18 (1) 18-19 (2) 19-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	06-07 (2) 07-09 (4) 09-10 (3) 10-11 (2) 11-12 (1) 15-17 (1) 20-22 (1) 22-00 (2) 00-04 (3) 04-06 (1)	02-04 (1) 04-07 (2) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	06-07 (1) 07-08 (3) 08-10 (4)† 10-12 (3)† 12-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	05-07 (1) 07-08 (3) 08-10 (4) 10-13 (3) 13-18 (4) 18-19 (3) 19-21 (2) 21-23 (1)	06-07 (3) 07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-00 (4) 00-02 (3) 02-06 (2)	18-19 (1) 19-21 (3) 21-03 (4) 03-05 (2) 05-07 (1) 19-21 (1)* 21-02 (2)* 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	06-07 (1) 07-08 (3) 08-10 (4)† 10-14 (3)† 14-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	05-06 (1) 06-07 (2) 07-09 (3) 09-13 (2) 13-15 (3) 15-20 (4) 20-21 (3) 21-23 (2) 23-00 (1)	04-06 (1) 06-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-00 (4) 00-02 (3) 02-04 (2)	19-21 (1) 21-01 (2) 01-03 (1) 03-04 (2) 04-06 (1) 21-05 (1)*
McMurdo Sound, Antarctica	07-08 (1) 08-09 (2) 09-10 (1) 17-18 (1) 18-20 (2) 20-21 (1)	06-07 (1) 07-09 (2) 09-10 (1) 14-16 (1) 16-18 (2) 18-22 (3) 22-23 (2) 23-00 (1)	06-08 (2) 08-09 (1) 16-18 (1) 18-20 (2) 20-02 (3) 02-04 (2) 04-06 (1)	23-05 (1)

October 15 - December 15, 1982
Time Zone: PST (24-Hour Time)
WESTERN USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	06-07 (1) 07-08 (2) 08-11 (3)† 11-12 (2) 12-13 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (4) 12-13 (2) 13-14 (1)	05-06 (1) 06-08 (2) 08-10 (1) 10-12 (2) 12-14 (4) 14-16 (3) 16-18 (2) 18-20 (1) 23-01 (2)	18-20 (1) 20-22 (2) 22-00 (1) 19-23 (1)*
Central & Northern Europe & European USSR	07-08 (1) 08-10 (2)† 10-11 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	05-07 (1) 07-09 (3) 09-10 (2) 10-14 (1) 14-17 (3) 17-19 (2) 19-23 (1) 23-02 (2) 02-03 (1)	18-20 (1) 20-22 (2) 22-23 (1) 19-22 (1)*

Eastern Mediterranean & Middle East	07-08 (1) 08-10 (2)† 10-11 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	06-07 (1) 07-10 (2) 10-14 (1) 14-16 (2) 16-18 (1) 18-20 (2) 20-22 (1) 00-02 (1)	18-22 (1) 06-08 (1)
Western Africa	06-07 (1) 07-08 (2) 08-11 (3)† 11-13 (4) 13-15 (3) 15-16 (2) 16-17 (1)	05-06 (1) 06-07 (2) 07-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	05-10 (1) 10-14 (2) 14-15 (3) 15-20 (4) 20-22 (3) 22-02 (2) 02-03 (1)	18-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Eastern & Central Africa	07-08 (1) 08-10 (2)† 10-14 (3) 14-15 (2) 15-16 (1)	06-08 (1) 08-12 (2) 12-16 (3) 16-17 (2) 17-19 (1)	06-14 (1) 14-16 (2) 16-22 (3) 22-23 (2) 23-00 (1)	18-21 (1) 06-08 (1)
Southern Africa	07-08 (1) 08-10 (3)† 10-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	06-10 (1) 10-12 (2) 12-13 (3) 13-16 (4) 16-17 (3) 17-19 (2) 19-21 (1)	06-12 (1) 12-14 (2) 14-16 (3) 16-19 (4) 19-22 (3) 22-01 (2) 01-03 (1)	17-19 (1) 19-20 (2) 20-21 (1) 06-08 (1) 18-19 (1)*
Central & South Asia	16-17 (1) 17-19 (3)† 19-20 (1) 07-09 (1)	16-17 (1) 17-19 (3) 19-20 (2) 20-21 (1) 07-09 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-11 (1) 16-17 (1) 17-19 (3) 19-21 (2) 21-22 (1)	17-19 (1) 04-09 (1)
Southeast Asia	08-09 (1) 09-10 (2) 10-11 (3) 11-12 (2) 12-14 (1) 14-15 (2) 15-17 (3)† 17-19 (2) 19-20 (1)	07-08 (1) 08-11 (3) 11-12 (2) 12-15 (1) 15-17 (3) 17-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1) 19-22 (1) 22-01 (2) 01-03 (3) 03-06 (2)	02-03 (1) 03-06 (2) 06-08 (1) 03-06 (1)*
Far East	13-14 (1) 14-15 (3) 15-19 (4)† 19-20 (2) 20-21 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (2) 13-15 (3) 15-17 (2) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-12 (3) 12-14 (2) 14-18 (1) 18-20 (2) 20-21 (3) 21-23 (4) 23-02 (3) 02-06 (2)	23-01 (1) 01-05 (2) 05-07 (3) 07-08 (1) 01-05 (1)* 05-06 (2)* 06-07 (1)*
South Pacific & New Zealand	08-09 (1) 09-10 (2) 10-19 (4)† 19-21 (3) 21-23 (2) 23-00 (1	07-08 (1) 08-11 (4) 11-18 (3) 18-00 (4) 00-02 (3) 02-03 (2) 03-04 (1)	11-18 (1) 18-19 (2) 19-21 (3) 21-04 (4) 04-07 (3) 07-09 (4) 09-10 (3) 10-11 (2)	21-22 (1) 22-00 (2) 00-07 (3) 07-08 (2) 08-09 (1) 22-00 (1)* 00-06 (2)* 06-07 (1)*
Australasia	09-11 (1) 11-12 (2) 12-14 (4) 14-18 (3)† 18-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	07-08 (1) 08-12 (3) 12-14 (2) 14-18 (1) 18-20 (2) 20-21 (3) 21-00 (4) 00-01 (3) 01-02 (2) 02-03 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-04 (4) 04-07 (3) 07-09 (4) 09-10 (3) 10-12 (2) 12-14 (1)	02-03 (1) 03-04 (2) 04-07 (3) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	06-07 (1) 07-08 (3) 08-10 (4)† 10-15 (3) 15-17 (4) 17-18 (2) 18-19 (1)	05-06 (1) 06-07 (2) 07-10 (4) 10-14 (3) 14-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	06-08 (4) 08-10 (3) 10-14 (2) 14-16 (3) 16-00 (4) 00-02 (3) 02-04 (2) 04-06 (3)	18-19 (1) 19-21 (3) 21-02 (4) 02-05 (2) 05-06 (1) 19-21 (1)* 21-02 (2)* 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil Chile Argentina & Uruguay	06-07 (1) 07-13 (3)† 13-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	06-07 (2) 07-09 (3) 09-14 (2) 14-16 (3) 16-21 (4) 21-23 (3) 23-02 (2) 02-06 (1)	12-14 (1) 14-16 (2) 16-18 (3) 18-00 (4) 00-01 (3) 01-03 (2) 03-05 (1) 05-07 (2) 07-09 (1)	20-22 (1) 22-04 (2) 04-05 (1) 22-04 (1)*
McMurdo Sound, Antarctica	07-08 (1) 08-09 (2) 09-10 (1) 19-20 (1) 20-22 (2) 22-23 (1)	06-07 (1) 07-09 (2) 09-12 (1) 14-17 (1) 17-20 (2) 20-23 (3) 23-01 (2) 01-02 (1)	16-18 (1) 18-20 (2) 20-04 (3) 04-05 (2) 05-06 (1) 06-08 (2) 08-10 (1)	00-05 (1)

*Indicates best time to listen for 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a Propagation Index of (2), or higher.
†Indicates best times to check for 6 Meter F-2 layer DX openings. While such openings will not occur frequently, some may be possible when day-to-day conditions are HIGH NORMAL or better

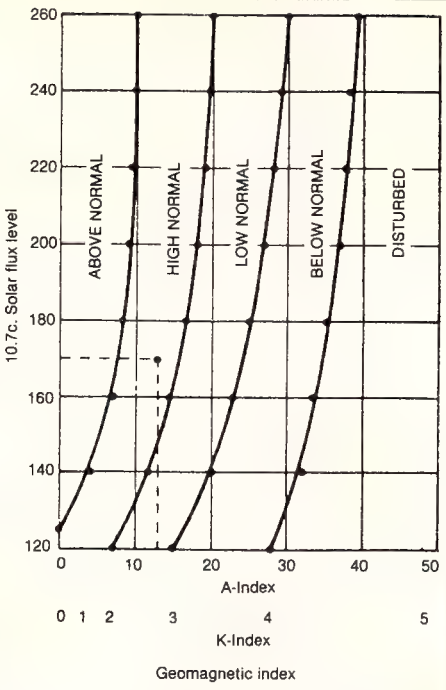


Fig. 1– Intersection of given values of solar flux and geomagnetic activity determine expected h.f. ionospheric propagation conditions. (Example: Solar flux is 170 and A-index is 13; expect High Normal condition.)

an hour or two after sunrise through the early afternoon. In the western half of the country, look for openings towards the South Pacific, Australasia, and the Far East during the late afternoon hours.

Trans-continental and 6 meter openings over shorter distances are also expected during October and the fall and winter months. Check for such openings during the early afternoon hours.

Orionoids, a major meteor shower, is expected to begin around October 20th and last for about two days. Expect as many as 25 meteors an hour to enter the earth's atmosphere during the peak of this shower. This should make possible some fairly good meteor-type ionospheric openings on the v.h.f. bands.

There is usually a seasonal increase in auroral activity during October. This should result in an increased number of auroral-scatter-type openings on the v.h.f. bands. There are also increased chances for short-skip sporadic-*E* propagation during periods of auroral activity, particularly on *10* and *6* meters. Check the Last Minute Forecast appearing at the beginning of this column for the days that are expected to be Below Normal or Disturbed. These are the days upon which auroral activity is most likely to occur during the month.

C.W. Contest Forecast

This month's DX Propagation Charts are valid for *both* the Phone and C.W. sections of the 1982 Contest. *Be sure to keep them handy for use during next month's C.W. section as well.* Short-skip Propagation Charts for use during October appeared in last month's column.

More radio amateur activity in more areas of the world takes place during the *CQ* World Wide DX Contest than at any other time. For this reason, the Contest offers an excellent opportunity to verify the accuracy or inaccuracy of the *CQ* Contest predictions and forecasts. Reports received from participants in previous Contests have contributed significantly to improving these predictions during the past 31 years. Comments or observations concerning this year's Contest would be appreciated, and should be sent directly to me, W3ASK. Good luck in the 1982 Contest!

73, George, W3ASK

NEWS OF COMMUNICATIONS AROUND THE WORLD

Drink iron from rare springs;
Follow the sun;
Go far
To get the beam of some medicinal star;
Or in your anguish run
The gauntlet of all zones to an ultimate one.
Fever and chill punish you still,
DX has no zone to work against your will . . .

One of the better things about newly minted DXers is that usually they are devoid of any question but to ask where the DX is. But let them work a handful, maybe even gain the DXCC status, and they are filled with questions. These can be trying times to any ancient DXer within reach. Perhaps even to those not too ancient. Last week one was up the hill to ask some questions. Some of the questions had been asked before.

"Tell me something," this QRP DX type asked, "isn't there a bit of inconsistency in the DXCC country list criteria, and do you think we might ever run out of new DXCC countries?" We were thinking that is was almost inevitable that this one would come with his questions; we had recently seen his call listed as a new DXCC member. One always gains status when gaining membership in the DX Century Club. Only the deserving are found there. But for now we had before us a couple of sticky questions; we thought that we could answer them. But, then again, we sometimes suspect that perhaps the years may provide the answers but not the solutions. So we asked, "Inconsistencies? Like what?"

It was evident that this QRPer had come prepared. "Well, how about some of the ZL-islands such as Chatham and Auckland? Seems that when I measure the distance, these islands are only about 300 miles offshore. How come they count as DXCC countries when Bounty Island, which is just about as far from New Zealand, does not? Isn't that an inconsistency? And how about Jarvis Island? And come to think of it, how about . . . ?"

We were holding up our hands at that point, for we suspected that the how-abouts might be long and we wanted to take them one or two at a time.

"You will have to understand," we cautioned, "that DXing is a thing both ancient and honorable. For sure, there is nothing else within amateur radio which has an older or more revered past. And there are still some among us who knew Guglielmo Marconi, Hiram Percy Maxim, and the young Sam Canter. And in DXing, ancient and honorable as it is acknowledged to be, there is the even more ancient and honorable tradition that tells us that what was will always be, that what you once had for a DXCC counter will be yours forever, and that what was proper in the past will be eternally proper, though possibly inconsistent with current criteria." We paused at this point to note how the QRPer was taking things, leaning close to ask, "Certainly you can understand all of that, can't you?" Apparently from the look on his face he did not, but we had no intention of letting him off easily. One must always be vigilant and wary of any possible heresy which might diminish one's DXCC total. And any new DXCC type must learn sometime that the road to the Honor Roll is strewn with rocks and ruts and pitfalls, and at this time we were going to chart a few for him.

Georges, F2CL, who now is making the very rare Crozet Island available to the multitudes as FB8WG. QSL's go to Georges de Marrez, Santa Severa, 20228 Lurt, France. (Photo via Jack, W2LZX)

"As for those islands off the coast of New Zealand," we continued, "the answer is very simple. Your current Rule 2-B of the Country Criteria was written in 1963. Before that time a 225 mile rule applied to all offshore islands, 225 miles being the required offshore distance from the mainland for a country to qualify for DXCC country status. To answer your question, before 1963 Chatham, Kermedec, Auckland, and Campbell were DXCC counters because there had been amateur operations from those islands. There had not been any operation from Bounty Island. So when 2-B was added in 1963 to delineate things a bit further, it became necessary that there be 500 miles between islands in an island group to qualify for additional DXCC status. But as Auckland, Chatham, Kermedec, and Campbell Islands were already on the DXCC country list, they were grandfathered into the system. They qualified then; they would not qualify now. But Bounty had not qualified then because of no amateur operation; it cannot qualify now. Isn't that rather simple to understand? And the same applied to Jarvis and a lot of other islands.

"And it was further decided," we continued, "that actually New Zealand is really an island group and should not be considered the mainland. You must keep in mind that an island is a body of land smaller than a continent and surrounded by water. Conversely, a continent is a body of land larger than an island surrounded by water—Europe for example." We thought for a moment. "Better make that Asia . . . or better yet, South America. Wait! Let's say Australia. That one certainly is too big for an island, although a bit on the small size for a continent."

We were feeling pretty good about ourselves at this point, for we were thinking that we had been a bit dazzling with our display of obscure and abstruse DX knowledge. But hardly dazzled was the QRPer. His eyes were blank, his jaw hung slack. We shook him gently. "Awake!" we said. "Do you understand all of that?" We were hoping for the best, but all we got was a blank look.

"Maybe it will come to me later," he said, "maybe much later."

For awhile we thought that things might be looking bleak for the future of DXing, but hardly a minute had passed before he recovered and was back at us. "But what good is the criteria if it is not always applied equally," he demanded. "It is inconsistent, I say, and I just don't understand how you can stand there and try to explain it as being all right." He was leaning closer to lend emphasis to his words. "And a bit glibly, I might add," he continued.

If we were not DXers it might have been possible to take offense at the tone of his voice, but we did not. We just moved in a bit closer to work on converting him, for we knew that any new DXer once converted stays converted forever.

"How come you haven't mentioned 4U1ITU?" we asked, "and how about 4U1UN and 1A0KM? You've worked those, haven't you? And are you now saying that to be always consistent you are willing to give up those counters?" The results were immediate. His face flushed and his voice broke with agitation.

"Heck no!" he declared vehemently.

77 Coleman Dr., San Rafael, CA 94901

The WPX Program

Mixed

990	JF1SLN	992	KC0CP
991	JA3IEF	993	WB5BIR

S.S.B.

1507	OE1WO	1511	I7IEH
1508	JR6LLN	1512	GI4NKE
1509	WD8IDD	1513	XE1AZ
1510	Y26DO	1514	K8ZZW

C. W.

2153	K2PK	2156	DL3DD
2154	KC2PL	2157	K9AYK
2155	DF5UT	2158	EA7AJY

VPX

226 ..... IN3-59358

Endorsements

Mixed: 450 N3KR, OE1WO. 500 OE1WO. 600 WB3DNA. 700 VE2FOU. 750 W9RY. YU2CQ. 800 KO8T, OE1KJW, YU2CQ. 850 W2KE. 900 IT9QDS. 1050 I2DMK, SM6ID, YU2CAL. 1100 SM6ID. 1950 YU4HA. 2000 YU4HA.

S.S.B.: 350 JR6LLN, XE1AZ, OE1WO. 400 K8ZZU. 450 JA9DDM, VE1ACK, K8ZZU. 500 W3ARK. 550 W3ARK. 600 W3ARK. 750 IV3YRN, DF7QD. 800 IV3YRN. 850 W3YRN, VE1YX. 900 I1HAG. 950 PY3BXW, KC4OV. 1000 WA1JMP, PY3BXW. 1050 WA1JMP, PY3BXW. 1550 I8KDB. 1800 K2POA.

C.W.: 350 K2PK, DF5UT, SM5DAC, DL3DD, K9AYK. 400 K2PK, DF5UT, DL3DD, K9AYK, SM5DAC. 450 K2PK, DL3DD, W0JIE. 500 K2PK, DL3DD, DL9FM, GM3YTS. 550 K2PK, DL9FM, AG5C, GM3YTS. 600 K2PK, DL9FM, AB4D, GM3YTS. 650 AK9Z. 750 K9WA. 800 K9WA, WA1JMP. 850 K9WA, W1DMD. 900 K9WA, K9UE. 950 DL7MQ. 1550 N6JV.

10 meters: GW3SB, W3ARK, DF7QD, KL7AF.
15 meters: VE2FOU.
20 meters: WA2CNF, XE1AZ.
40 meters: UB5-0683.
160 meters: W4BQY, UB5-0683.

Asia: W6MUL, OE1WO.
Europe: K9AYK, Y26DO.
No. America: OE8MOK.
So. America: KA3A.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to CQ WPX Awards, P.O. Box 1351, Torrance, CA 90505-0351 U.S.A.

"I've got just 102 countries worked, and if I should lose those three I'd probably be off the DXCC listing. I worked hard for those countries and my DXCC certificate, and no one is going to get even one away from me without a fight. Never!" There was hardly anything else we could say on the matter. This one certainly looked as if he had been converted.

Most DXers have run this track somewhere along the way, and sometimes you will note the reaction of this QRPer in others. When one is young, DX or otherwise, there are a number of things to bring on an attack of righteous indignation. But when one gains in the accumulation of the years, wisdom often comes. And though the inconsistencies may bring some questions at times, usually the reason will be realized with time. And when the reason is known, who would want to change what so many have cherished over the years?

As has been said before, DXing is a state of mind in a moveable feast. DX and DXing are full of tradition, and few if any DXers would be willing to give up even a deleted country without a fight. Those who may come late to the feast should honor and revere the traditions. For one thing, anyone late on the scene will find scant fraternalism extended when an argument is made that some of our DXCC counters are less than 24 carat in purity.

But we still had the QRPer on our hands and even though he may not have welcomed or understood all the answers, he was still one who came seeking some clues to the Eternal Enigmas of DXing.

"Look at it this way," we said, trying anew. "It has been said that he who has many has no excess and he who has little will never lack. And as for running out of new DXCC countries, they never have and probably never will. Don't ask why. Just remember that that is the way it has always been, and that is the way it will always be. And that is a DX tradition!"

JH1WKS/J2IX

Back in the May issue we ran an item about JH1WKS, Chiyono Suzuki. Along came Bill Chambers, W7BYK, with an excerpt from the old *'R9'* magazine and in the 1934 issue there was Suzy, even then working DX on 40 meters. The article back almost 50 years said that Suzy was then the only YL amateur in Japan.

Suzy was the sister of J1DN, who was a well-known JA DXer back a half century; he unfortunately became a Silent Key early in the thirties in a typhoid epidemic. Still active on the DX bands, many have worked Suzy on c.w., her preferred mode.

BY1PK

Kan Mizoguchi, JA1BK, was in China last May. Kan represented the JARL in a visit to Beijing and the China Ministry of Communications. One objective of the visit was to get more activity from BY1PK for the deserving. Kan advised the Chinese authorities that there were at least 50,000 anxious DXers lined up and waiting to work BY1PK.

JA1BK was on the West Coast after his China trip. He was here attending the annual Semiconductor Show in San Mateo. Kan reported that he visited some of the pre-war operators, including XU8TC, during his Beijing visit. A visit was made with the current operators at BY1PK and suggestions were made to help increase the QSO rate. This included operating contest style and aiming for a QSO rate of around 300 per hour and spreading the listening area out, possibly up to 50 kHz.

Kan reported in May that only three of the seven operators initially chosen for training were qualified operators, these being Tong, Guo, and the YL Jiao. Operations up to the time of the visit had been only on c.w.; the JA's donated two electronic keyers, but if and when they would be put into use was not known. The presently qualified operators will be moving out to other provinces to put other stations on the air and to train more operators. Call letters will be similar to that cur-

This is Tong, one of the operators at BY1PK. This photo was taken by JA1BK, Kan, during his visit to the Ministry of Communications in Beijing in May. Kan was seeking to help bring increased activity from mainland China and to offer any needed technical assistance to the BY amateurs. (Photo via JA1BK)

rently heard: 'B' the China prefix, 'Y' indicating a club station, the number for the province, and the last two letters for the city in which the station is located.

Sometime soon, possibly this month, a new building in Beijing will be completed for use by BY1PK, and a move will be made from the initial facilities. The new building is expected to have two rotary beams going shortly after the station is moved to the new quarters.

The equipment in use during Kan's visit was a Yaesu FT-107 transceiver with a Dentron MLA 20006A KW amplifier. This setup caused some t.v.i. with the station operating full-bore, so power has been reduced to around 400 watts. The station also has a Kenwood 600 all-band receiver and a Chinese-built all-band receiver resembling a recent RCA model. BY1PK is using a TH6DXX for the higher frequencies with a cage antenna for 40/80. As of the time of Kan's visit, there was no v.h.f. or u.h.f. activity going in China.

The present operating frequencies available for Chinese amateurs were given as: 3.5–3.6 MHz, 7.0–7.1, 10.0–10.150, 18.0, 24.0, and 28.0–29.7. This list does not show the 20 meter band nor the 15 meter band, both of which have seen c.w. activity by BY1PK. So it may be best to use it for guidance while watching for 20/15 meters around 50 kHz above the band edge or a bit lower. S.s.b. apparently is not used because the operators are not skilled in the English language, and thus c.w. is expected to be the mode for some time to come. Some reports say s.s.b. may be heard early next year.

Various sure-fire QSL routes are given, so there is a choice. The address of the station is Box 6106, Beijing, People's Republic of China. Some recommend enclosing two IRCs because of the postage rates, although one IRC is supposed to be good for one first class mail rate in all countries of the world. As opportunities such as this are welcomed by Slim, he has been more than active in this instance. Send a card for a Slim contact and you get a nice picture postcard in return, this to soften the message that you worked the ubiquitous one.

Whatever the problems, the signs are that BY1PK may be around for some time, although late in June some reports said that the station went QRT in April, and others said that they worked the station in May. Kan did feel that the signs are good and amateur stations will be heard from the Peoples Republic of China in increasing numbers.

Prefixes—Brazilian Islands

LABRE, the Brazilian amateur society, recently announced a new table of allocations for the Brazilian off-shore islands. The new table also provides for license class identification. Brazil has license classes of *A, B,* and *C.*

The islands and their suffixes are Fernando de Noronha, PY0F; Martin Vaz, PY0M; Atoll de Rocas, PY0R; Sao Pedro/Sao Paulo, PY0S; Trinidade, PY0T.

Not all of these are DXCC counters, but the alert and deserving types will find the counters easily. For classes *A* and *B*, the call will be the island identifier followed by one or two letters. PY0SAA, for example, will identify the island as well as the class of license. For class *C* there is a reversal with either *W, X,* or *Y* following the 0 and then the identifier letter for the island (PY0WT for Trinidade).

Visitors to Brazil looking to operate from any of the islands should forward an application to LABRE (Liga de Amadores Brasileiros de Radio Emissao), CP 07004, CEP. 70000 Brasilia, DF Brasil. Send a copy of the original license, identification card, or passport with $2.00 for the necessary Communication Ministry fees.

Italian Prefixes

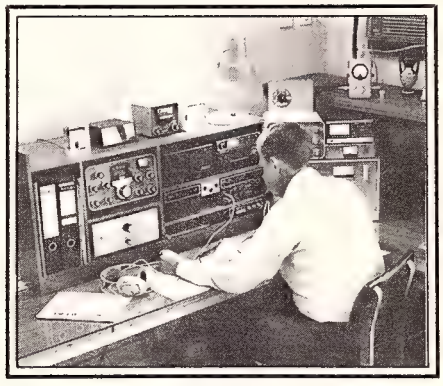
A couple of months back we ran the list of Italian call prefixes intending to identify the offshore islands. We got a couple of the mainland prefixes mixed in with the islands, and for those who have been lost since, here are the prefixes which are mainland areas and not islands: IX1, Valle d'Osta; IN3, Trentino, Alto Adige; IV3, Friuli, Venezia Giulia. Otherwise, everything else is fine as you saw it in May *CQ*. It also might be noted that last year a reciprocal licensing agreement was signed between Italy and the U.S. ARI, the Italian Amateur Radio Society, will assist anyone looking for a permit for a short visit or a license and Italian call sign if a resident. Write to Manuel F. Calero, I4CMF, Associazione Radioamatori Italiani (ARI), Reciprocal Licensing Department, Via Giorgione, 16, I-40133 Bologna, Italy. The telephone number is (051) 389502. There! All you need to straighten out the Italian licensing allocations and the route to a reciprocal license.

HZ1AB

Bob Walsh, WA8MOA, has been working for ARAMCO for the last couple of years and in between other matters has been engaged along with others in rehabilitating HZ1AB. During a recent vacation in the states, Bob mentioned that among other things there is an interest in filling in some blank spots on past HZ1AB operations.

Bob would like to get some photocopies of old HZ1AB QSL cards, especially those before 1977. For the shack there they would like copies of any old photos of activities at HZ1AB as well as some information on anyone who operated the station in the past. A photo of past operators would also be welcomed.

The address for HZ1AB is correct in the current Call Books. If you want to write Bob directly, try sending a note via Bob Walsh, c/o ARAMCO, Box 8581, Dhaharan, Saudi Arabia.



Here is Mike Smedal, A7XD, at the operating position of his station in downtown Doha, Qatar. Note the absence of clutter, the casual dress, and the air conditioner. No stray wires even showing, all of which attests to the technical proficiency of the operator. Mike previously was EP2LI in Iran and figures to be in Qatar for several more years. (Photo via W7OM)

Qatar

Mike Smedal, A7XD, is the first outsider to be granted a Qatar license since that Arabian Gulf country became independent of British rule 10 years ago. Previously, the country had the MP4Q prefix and even previous to that Mike was signing EP2LI in Iran.

Should you wonder what one does in downtown Doha when the bands are not open, you might scan the roll-call on the gear in the photo. From the top, a McKay DP-40 pre-selector, an MFJ-1030BX active receiver pre-selector, an ICOM 701, and ICOM IC2KL, these being a transceiver and linear. Then another Alpha 77SX linear. For antennas Mike has a TH7DX, a 40 meter vertical, and an 80 meter sloper. Mike also has a Macrotronics M80 RTTY converter, a Radio Shack microprocessor, an Epson MX80 printer,

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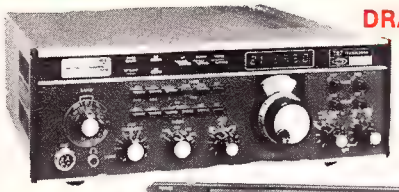
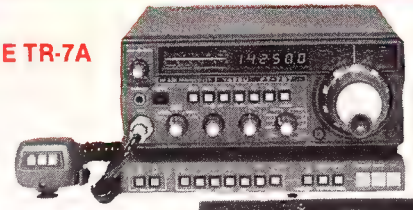
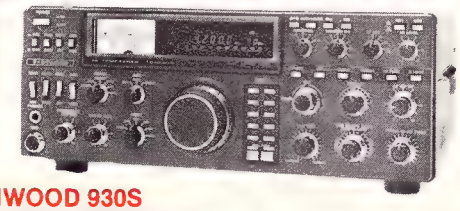


DRAKE TR-7A



YAESU FT-707

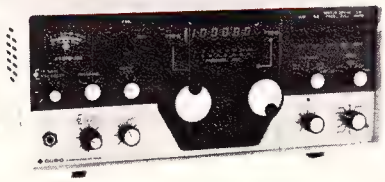
ICOM IC-720A



TRIO-KENWOOD 930S

KDK FM-2025

CUBIC ASTRO-103



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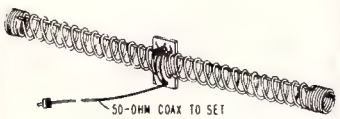

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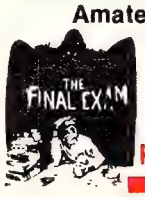

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CIRCLE 32 ON READER SERVICE CARD

plus a lot of accessory gear. He hopes soon to be on satellite. A look at the photo of Mike at his operating position at AX7D indicates the technical excellence of his operation.

Heard Island

Recently a query came on the last operation on Heard Island. Though a number have aimed in that direction, the 6 month operation of VKØHM back 12 years or so seems to have been the most recent; prior to that in 1969 there was a brief one.

When? It looks like the coming February is getting more solid all the time. It will be Spring there on Heard, and the Wireless Institute of Australia is well along in its organization efforts.

Here in the states, the Northern California DX Foundation and the International DX Foundation have each pledged $10,000 towards the effort, this to meet part of the costs of the efforts and to provide a good start in the fund raising. It is reported that the 'ANACONDA II' has been chartered in Australia. Plans have been made for three operators on the effort plus possibly a fourth from the scientific/mountaineering portion of the effort.

VKØHI is expected to be the call sign and is planned to be on the air for at least four weeks. Those who want more information might drop a note to Bob Schenck, N2OO, who is handling the IDXF publicity and who has a 42-page booklet on Heard, giving its history, geography, weather, and allied information. You can get the book for $10.00 for non-IDXF types or $5.00 for IDXF members.

Getting back to the funding, all this is being handled by the Wireless Institute of Australia. The address for this Heard Island fund is Heard Island Fund, c/o Wireless Institute of Australia, Box 10, Perth 6005, Western Australia, Australia.

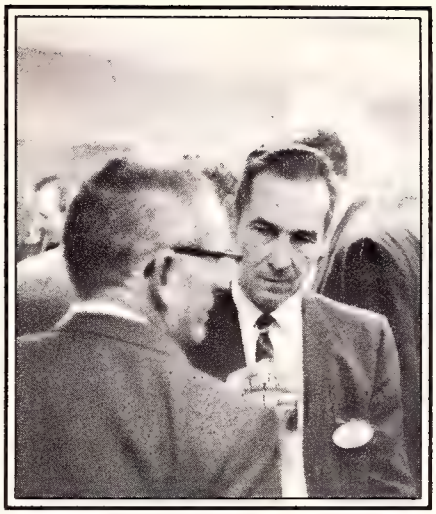
All of this may help you in planning your 1983 vacation. Keep in mind that every time there is a Heard Island operation because the U.S. Coast Guard stops there, NASA has a scientific station, or Australia sends a scientific/mountaineering effort to its island, the less need there is for another trip. A Heard in the hand is worth a decade of waiting.

Shortly Noted

Those who worked GB4GM during the August operation at the four extreme points of mainland Scotland should QSL via RSGB. This was an effort of the Clyde Valley DX Group there in Strathclyde.

The EJ-prefix was used by the Irish amateurs a couple of months back to mark the Golden Jubilee of the EI society. Tom O'Connor, EI9U, is the new president of the IRTS, the Irish Radio Transmitters Society.

The Dutch Certificate Guide is available from VE3IZH, John Hofstee, at 425 Boyne Avenue, Listowel 1, Ontario. Send US $4.00 for the extensive listing. More than 75 certificates are described.



What does the true-blue Heard Island operator look like? Here is Bill Rohrer, VKØWR, who was on the USCGS Southwind *at its stop at Heard back in 1969, and who put VKØWR on the air for a few days. Skeptical? Look at that name tag! You don't see many VKØ Heard QTHs! (CQ staff photo)*

Long-time DX editor Alan Leith, VE3FRA, is wise to the ways of avoiding postal roadblocks. The Canadian DX Report shows in the states with a U.S. postmark. If you want more information on this DX bulletin, modeled along the lines of Geoff Watts' long-published "DX News," drop a line to Alan at 10 Fairington Crescent, St. Catharines, Ontario, Canada L2N 5W3.

SMØAGD, Erik Sjolund, currently in the far Pacific, was not able to make the T31/KH1 stop as planned back in June, but thought it might be possible later in the summer.

If you are still puzzling over some of the strange prefixes you caught during the summer, 4D was a Philippine prefix to mark the 50th anniversary of amateur radio in the islands. AM/AN/AO was used by the Spanish amateurs during the World Cup soccer matches. DPØLEX is a West German Antarctic base at Atka Island and often heard Thursdays, 14210/2000Z. RX7 was used to mark the 250th alliance of the Kazakh Republic in the USSR. RKØ2 is the Russian satellite and you can look for it at 29578 kHz. CJ5 was used in Saskatoon in early July; that's in Saskatchewan. 8J8XPO was a special call heard until August in Japan. QSL to the JARL.

The DXCC Advisory Committee voted to recommend that Serrana Bank, Bajo Nuevo, and the 8ZR Neutral Zone be deleted. Most of these plus others should have run through the route by now.

Soma Wickremasinghe, 4S7YL/ex-8Q7AC/VS9YL, became a Silent Key in late spring. A51PN is reported in some areas as off the air since last December but was also reported in the SEANET in June. Says he has too much work to do much operating. Maybe we should not have run that last item in among some Silent Keys. Pradhan is only quiescent. But also listed among Silent Keys has been Jesse Bieberman, W3KT, long noted for the W3KT QSL Service. Jesse was at the International DX Meeting in California this spring. V. Belopusov, UA3CA, and V. Rybkin, UA3DV, of the Central Radio Club Box 88 staff also were Silent Keys in early summer. W8HMI (ex-TU2AU/601AU/JY1AU/FL8AU/5U7AU) also was on the listing, as well as HS1WR, General Kam

The WAZ Program

10 Meter Phone

205	JA1CHN	208	JH1IED
206	SMØDRB	209	K1AS
207	F5VU	210	JI1QPU

15 Meter Phone

135	JA8UJY	137	KM6B
136	IØRIZ		

20 Meter Phone

411	KSØZ	414	WB7CLU
412	SM6BGG	415	IØRIZ
413	WØZH		

40 Meter Phone

19	4Z4DX	20	IØRIZ

80 Meter Phone

21	IØRIZ		

10 Meter C.W.

37	JA2EKR	38	AF5M

15 Meter C.W.

71	JH1XUP	72	JI1QPU

20 Meter C.W.

172	JA3DAY	174	K6QC
173	W7TE		

40 Meter C.W.

36	SM4BNZ		

All Band WAZ

S.S.B.

2475	KA3DDT	2484	JA7TAP
2476	N8ATR	2485	W4BIM
2477	HB9BMR	2486	K8ZZU
2478	JH1KRC	2487	OZ1BOD
2479	K4DLI	2488	OZ1BNZ
2480	I8JKN	2489	DJ9AL
2481	I2YJO	2490	PT7WA
2482	JA1NAQ	2491	JI1QPU
2483	W9CRN	2492	JA9ISK

C.W. and Phone

5395	NR4B	5403	K4QMU
5396	OZ1EOE	5404	HK3YH
5397	LA8KD	5405	HK3YH
5398	OE3OLW	5406	EA8VV
5399	JA4ESR	5407	KG7A
5400	DK5IZ	5408	JH1HIK
5401	DJ2VB	5409	JA1GRH
5402	WA4PSF		

All Phone

580	N4WJ		

Applications and reprints of the latest rules may be obtained by sending a self addressed stamped envelope (37 cents) size 4½ × 9½ to the W A Z Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all C.Q. awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application.

HAMTOURS tm

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February 19-25, 1983

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$949 from Chicago

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(per person, double occupancy)

(Price subject to change.)

Rates available from other cities, too!

- *7 days/6 nights at a shimmering seaside resort.
- *Operate top-line, new equipment.
- *Optional island tours, tennis, golf, snorkeling, helicopter tours, river cruises.
- *Authentic Hawaiian luau.
- *Transportation, transfers, tips, taxes included.
- *Hosted by WØXI, KAØNAU and a professional Maupintour Tour Manager.
- *Limited space available — reserve now or write for brochure.
- *XYL's will love the shopping, elegant dining and special activities we've planned.

☐ Save me space! $100 per person deposit enclosed.
☐ Send brochure.

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ADDRESS: _____

CITY/STATE/ZIP: _____

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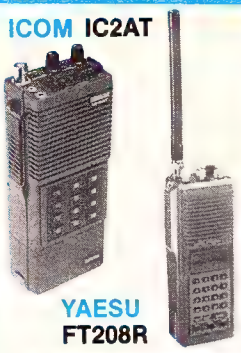
Phil Harrison, KAØNAU
1701 St. Andrews Dr.
Lawrence, KS 66044.

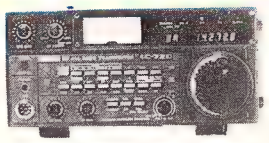
CIRCLE 73 ON READER SERVICE CARD

Dan's Got It All!

ICOM IC2AT



ICOM 720A



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YAESU FT-107M

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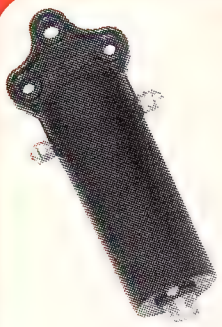
CIRCLE 53 ON READER SERVICE CARD



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- Lets your antenna radiate, not your coax
- Helps fight TVI—no ferrite core to saturate or re-radiate
- DC grounded—helps protect against lightning
- Heavy brass contact posts; non-rusting materials throughout
- May be used with antenna tuners; rated 5KW peak
- Handles substantial mismatch at legal limit
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- Rugged UV resistant custom Cycolac® case, not plastic plumbing parts

ZA-1A $17.95
3.5-30 mHz

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OF ONLY $44.95
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W2ONV
PRESIDENT
'73 Bill Salerno

Made According to OSHA Specifications

Immediate UPS Del'y

At last!! — a safety belt designed to meet the safety needs of radio amateurs, radio stations, TV stations, boat owners, painters, construction workers, maintenance people — anyone with the need to climb — now at an affordable price.
Our "ONV Safety Belt" is fitted with two drop forged steel "D" rings. Onto one is spliced a 3 foot length of ½" diameter nylon rope fitted with a drop forged steel snap hook. The 3" wide nylon body comfort pad is secured to 1¾" wide, 9500 lb. test nylon webbing, which is resin or latex treated for abrasion resistance.
The belt is adjustable up to size 46" waist.
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CALL TOLL FREE
800-526-5277

CIRCLE 60 ON READER SERVICE CARD

Chotikul, and Jim Lawson, W2PV. With all of those listed, the reading sometimes makes one feel a bit old . . . or older.

Northern California DX Club

Nearing a half-century of existence and often referred to as the oldest DX Club, the NCDXC with close to 400 members moved to continue its active life with election of another slate of officers for the work ahead. Eric Edberg, W6DU, is the new President; Ron Panton, W6VG, is back as Vice-President; Charles Patterson, K6RK, was reelected Treasurer; and Josephine Clarke, WB6ZUC, was brought back for another term as Secretary.

Bouvet

A January effort is planned by a group of German amateurs who are reported to have received permission to land on the South Atlantic island and to have licenses to operate. The callsigns 3Y0A and 3Y0B are reported as being assigned to the group who is working to raise the necessary funds for a three-week stay on the island. The costs will not be cheap; a suitable vessel has been located and will run about $45,000 to charter for the trip. Other expenses, including gear for the planned five or six operating stations, will run around $48,000 and possibly $50,000 when things get on track. Dieter Loeffler, DK9KD, is handling the fund raising, and anyone interested in helping can address him at Postfach 620.260, 5000 Koeln 60, West Germany.

3B8DA may be going to Rodriguez next month, and the November operation will be on all bands, 10 through 80, on this 3B9 trip. Ron Hill, K6OZL, who has been working as a radio officer on some large tankers, was reported a couple of months back as headed for Chagos to sign VQ9XX for a couple of months, maybe even four or so. QSLs go to N6BFA.

CQ DX Awards Program

S.S.B.

1150	EL2AO	1155	K8ZZU
1151	WB3IHQ	1156	AI9R
1152	WB4NDX	1157	YU1DZ
1153	I2TZK	1158	KC4OV
1154	JR7ICN	1159	W4BIM

C.W.

546	XE1XF	547	AI9R

S.S.B. Endorsements

310	DL9OH/318	275	K8CMO/297
310	VE3MJ/317	275	YU1DZ/293
310	VE3GMT/316	275	WB3DNA/285
310	YV1KZ/316	275	KC8JH/282
310	W4DPS/315	275	AI9R/276
310	N4PN/315	250	W4BIM/273
310	W0SFU/313	250	I0SGF/254
300	ZL1BIL/306	150	VE2PD/159
300	WB4NDX/304	28 MHz	ZL1BIL
300	W6DN/300	28 MHz	AI9R
		3 5/7 MHz	ZL1BIL

C.W. Endorsements

310	K4CEB/313	250	XE1XF/253
300	W4OEL/306	200	AI9R/237
300	K1MEM/300	28 MHz	AI9R
250	G2FFO/258		

The number of active countries is now 318. The basic award fee for subscribers to CQ is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an s.a.s.e. is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply

5B WAZ No. 37

Milan Dlabac, OK1AWZ, has joined the list of DXers who work just about everything around, Milan picking up 5B WAZ #37 this spring.

First licensed in October 1967, Milan holds the highest Czech amateur license, allowing him to use 500 watts d.c. into the p.a. Living near Prague, Milan is a test engineer for a broadcast station there. Married, there are two boys in the family, Peter and George. While primarily working s.s.b., Milan also used the c.w. mode especially on 40/80.

With 308 DXCC countries worked on mixed modes, Milan has 5B DXCC #297, 5B WAS #33627, and 5B WAZ #37. Other awards he holds are WAP, 5BWAC, USA-CA, WA/VK/CA, DUF exc., WPX, and a handful of others.

Antennas include a 75-foot vertical with 36 radials for 40/80 meters, a 4-el Yagi at 65 feet for 20 meters and a 5-el Yagi at 70 feet for 15 meters, and a 3-el wide-spaced Yagi for 10. The gear includes a Yaesu FT-901DE.

5B WAZ No. 40

Ossi Lehvas, OH3YI, has attained one of the most difficult awards in amateur radio, 5B WAZ. First licensed back in 1962, Ossi is Administrative Chief at a savings bank. Behind the title, Ossi says that he is " . . . the number two boss."

OH3YI is single, is 38 years old, and holds the Finnish Extra Class license. Primarily he works in s.s.b., but he does jump into the c.w. action when it means a new one or there is a jumping c.w. test going on. Equipment is the Drake T4XC and R4C along with a Heath SB-220 linear.

Ossi got into radio on his own; no members of his family are engaged in the higher pursuits. He graduated with a degree in economics and administration. Just take a look at the photo and you will see the face of a determined DXer.

The last two worked for the 5 Band Award were VO2CW and KH6XX, both of these on 80 meters. The last QSL cards to arrive were from Zone 29 for a 20 meter QSO and from Zone 23 for QSO's on 20 and 15.

OH3YI belongs to none of the local clubs and also does not check the nets, DX or otherwise. Sometimes he gets into the contests, working 20 meters at

The WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ master prefix list. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be up-dated annually by addition to, or to confirm present total. If no up-date, file will be placed into "inactive" until next up-date. Lifetime Honor Roll fee $2.00, with no fees required for up-dates.

MIXED

2300	YU2DX	1600	N6JV	1262	IN3ANE	1001	YU3APR	768	W0JIE
2230	F9RM	1584	DJ7CX	1240	K6ZDL	956	LA7JO	765	AI8M
2090	K6JG	1555	N2AC	1238	K5DB	923	WB8YQX	757	AJ6O
2025	K6XP	1542	N4NO	1235	KF2O	921	YU2CBK	738	WD9IIC
2016	N2VV	1504	N9AF	1220	K9BG	901	I2MQP	727	K7CU
2009	W2NC	1493	W8CNL	1205	DL1MD	893	JA1KRU	722	W6OUL
1954	VE3GCO	1448	YU7AW	1200	W8RSW	879	N4IB	707	YU4HA
1853	N4MM	1419	W9FD	1198	JH1VRQ	865	DA2DC	703	VE2FOU
1762	YU7BCD	1415	AA4A/8	1170	SM3EVR	865	WB8ZRL	700	I1ZQD
1759	W4BQY	1370	I6SF	1149	YU1OBA	850	KA3A	700	NN4Q
1723	W3PVZ	1325	N6AV	1145	N6AW	826	K2QF	650	KJ7N
1718	W7LLC	1307	W0SFU	1129	W7CB	820	K7AGJ	638	K9TI
1713	N4UU	1283	WA1JMP	1100	K8LJG	804	KO8T	630	OE1KJW
1711	W9DWQ	1282	N6FX	1056	N6JM	800	W6YMH	618	JA9FAI
1675	K5UR	1269	PA2TMS	1002	KL7AF	793	DK2BL	618	K8HF
1637	N6CW								

S.S.B.

2140	F9RM	1336	W9DWQ	1072	DL1MD	914	WA4OIB	743	PY4OD
2039	I0ZV	1276	OZ5EV	1062	PY3BXW	901	G4CHP	716	EA3KW
1868	I0AMU	1262	N4UU	1060	DJ7CX	901	I1MQP	700	N4IB
1797	K6XP	1250	N2SS	1044	W2CC	900	N2AC	681	W3GXK
1796	K6JG	1234	PA2TMS	1037	OE2EGL	883	KC8CC	668	DK4AP
1782	K2POA	1201	AA4A/8	1014	N6FX	851	I8KCI	652	KB2DE
1646	N4MM	1201	WD8MGQ	1011	KF2O	833	TG9GI	650	OE8MOK
1609	ZL3NS	1190	YU7AW	1005	ZP5RS	828	I0RIZ	629	YU3APR
1551	I1ZSQ	1189	HP1JC	996	JH1VRQ	820	WA2FKF	619	VK3NDY
1551	I8KDB	1170	WA4QMQ	990	KC4OV	810	I6NOA	611	JH5FQO
1427	K5UR	1154	I6ZJC	981	W6YMV	805	KL7AF	606	VK6YL
1421	YU7BCD	1134	N4NO	967	W2NC	802	I4LCK	606	W8RSW
1410	I0MBX	1121	DJ6VM	922	CT1UA	750	WB8ZRL	602	W0ULU
1357	W0YDB	1108	W4BQY	922	TG4NX	750	AC2J		

C.W.

1823	W8RSW	1420	YU7BCD	1316	N4MM	1069	LZ1XL	799	JH1VRQ
1784	W2NC	1415	N4UU	1315	K5UR	1056	N6FX	750	KL7AF
1715	W8KPL	1376	N2AC	1312	W9FD	1000	VE7CNE	735	DL1MD
1599	ON4QX	1375	G2GM	1258	VO1AW	965	JE1JKL	731	AA4A/8
1586	WA2HZR	1350	W9DWQ	1225	DJ7CX	930	N4YB	690	DJ1YH
1562	N6JV	1344	W3ARK	1136	YU7AW	853	DJ3LR	689	KA3A
1553	K6JG	1330	VK4SS	1127	W1WLW	827	I1YRL	682	JA5MG
1511	K2VV	1324	N4NO	1122	I6SF	804	KF2O	605	VE2FOU
1475	K6XP	1317	W4BQY	1077	K6ZDL	800	K8LJG	600	OE1KJW
1467	DL1QT								

Ossi Lehvas, OH3YI, winner of 5B WAZ #40 and an always active Finnish DXer. A bank official, Ossi made the award without the assistance of nets, but an extensive antenna system did help . . . a lot!

OH3AA in the CQ WW CW Test in 1981. He is the DX Manager of SRAL, the Finnish Amateur Radio League. He also holds 5BDXCC #215.

The antennas are an inverted Vee for 80, a dipole and vertical for 40, a 4-element beam at 75 feet for 20, a 3-element beam at 90 feet for 15, and a 4-element beam at 65 feet for 10 meters.

Ossi started DXing back in 1965 and little has gotten by him since then. Anyone with No. 40 5B WAZ is testament to that!

QSL Information

AM3SF to EA8SF
AM0SF to EA8SF
AM05BYU to EA5BYU
CU5UA to CT1UA
DA1WA/OH0 to KN6G
H5AIR to ZS6BSK
H44SH to AD1S
PA3AAN to WD8MGQ
UY4L to UA4LM
V9ADX to ZS6GH
VK0DX to VK7LJ
VQ9XX to N6BFA
YV1CD to WA1ROI
YV1DQU to WA1ROI
ZL1AEO to WB8WMS
4D9RG to DU9RG
OH0XZ to Box 39, SF-00801, Helsinki 80 Finland (March 26-29, 1981 only)

W2YTO advises he is no longer the QSL Manager for VU2YK or VU2RAK. Too much of a problem in getting logs. Any cards for these stations are being returned.

The W3YT QSL Service ended with the passing of Jesse Bieberman, and no further business is being handled through that route.

Ham Shop

FREE TO CQ SUBSCRIBERS

Advertising Rates: Non-commercial ads are 10 cents per word including abbreviations and addresses. Commercial and organization ads are 35 cents per word. Minimum charge $1.00. No ad (non subscriber) will be printed unless accompanied by full remittance. Non-Commercial ads free to CQ subscribers (maximum 3 lines per month). All ads must be typewritten double spaced. Recent CQ mailing label must accompany ad.
Closing Date: The 10th day in the third month preceding date of publication. Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publisher of CQ cannot vouch for the merchandise listed therein. Direct all correspondence and ad copy to: CQ Ham Shop, 76 N. Broadway, Hicksville, NY 11801.

COUNTY MAPS: 3 ft. by 2 ft. showing 48 states and all counties. $2.50 each. Bill Runser, 3000 Mt. Royal Blvd., Glenshaw, PA 15116.

WANTED: R644/URR 20-237 MHz Receiver as offered/shown by Fair Radio, Dec. 79 CQ, p. 97. T.J. LeVell, Box 446, Lakehead, CA 96051.

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OLD TIME RADIO transcription discs wanted. Any size, speed, subject. W7FIZ, Box 724, Redmond, WA 98052.

ROSS $$$$ Used Specials: Yaesu FT 620B $259.00, FT101B $449.00. Heath Kit SB104A $380.00, SB303 $159.00. Kenwood TS520 $419.00, SM220-BS8 $329.00. Icom IC245 SSB $245.00, IC21A $189.00, IC245 $169.00, IC255A $200.00. Send SASE for more used specials. Closed Monday at 2:00. ROSS DISTRIBUTING CO., Preston, ID 83263, (208) 852-0830.

MICROPHONES WANTED for broadcast historical archives; early GE, Westinghouse, RCA, Western Electric, Universal, etc. James Steele, 477 Madison Avenue (#1405/NAB), New York, NY 10022.

SENIOR CITIZENS AMATEUR RADIO SOCIETY now accepting Memberships. Send SASE for particulars to: S.C.A.R.S., Post Office Box 190, Newfield, NY 14867.

SAFETY BELTS: Professional lineman. $30 and up. Free info. Avatar, W9JVF, 1147 N. Emerson, Indianapolis, IN 46219.

MARCONI WIRELESS TELEGRAPH CO.: Authentic 1914, engraved stock certificate. Invest in an historical document suitable for framing. $29. Satisfaction guaranteed. Write for free photocopy. Tarlen, Box 7554, N. Kansas City, MO 64116.

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QSL CARDS: $12.50/500, ppd. 400-illustration catalogue free. Bowman, 743 Harvard, St. Louis, MO 63130.

CIRCLE 4 ON READER SERVICE CARD

HEATHKIT Xmtr DX-40, $60; VFO-1, $30; Hammarlund Rcvr HQ-110, $135 with Speaker T-R Switch & shipping if you take the lot. Kris, KA2OIG, 607-257-6853.

FOR SALE: Heathkit receiver HR-1680 plus speaker and headset. Superbly built. $150 or B.O. or will trade for equivalent marine VHF. L. Swift, 20 Highland St., Gloucester, MA 01930, (617) 283-6319.

WANTED: Rural high school is starting a ham radio club; we need donations of almost any used, serviceable or repairable gear. Write Don Loving, Turner High School, Burneyville, OK 73430. Include phone number and I'll call you.

ROSS $$$$ New Special Kenwood R600 $300.00, TS830S $819.90. ETO Alpha 77D $3820.00. Yaesu FT ONE $2,385.00. LC207 $26.00, NC2 $55.00, FSP-1 $15.00, FT901D $800.00, FT901DM $910.00, FRG-7 $245.00. Send SASE for more new specials. Closed Monday at 2:00. ROSS DISTRIBUTING CO., Preston, ID 83263, (208) 852-0830.

TOWERS FOR SALE: Two 200 foot Rohn 45s with base insulators and guys. On ground in good condition. Will trade good 4CX5000A, socket, and chimney for new 8877, socket, and chimney. AK9F, 443 South Alma Avenue, Kankakee, IL 60901.

COMPLETE MORSE SYSTEM: Software decodes Morse without hardware interface. Speeds over 60 WPM. Transmit has buffered keybrd, macros, files. Disk $15. Bob Wiseman, 118 St. Andrews Dr., Cincinnati, OH 45245.

ANTENNA MAST-R unique tripod one-man installation of lt. wt., beams, dipoles, 2 mtrs. Brochure SASE Antenna, Box 8295, Shreveport, LA 71108.

QSLs WITH CLASS! Unbeatable quality, reasonable price. Samples $1.00 refundable. QSLs Unlimited, P.O. Box 27553, Atlanta, GA 30327.

FOR SALE: Hallicrafters SR400A Blue Label, plus power supply and remote VFO. 550 watts PEP. $450. Domenic, 516-744-3122.

WANTED!! VHS Format of classroom study material for Novice & General Class Amateur Radio study to pass FCC exams. Please send price and time of delivery to: Robert Gallery, 9214 Weathervane Pl., Gaithersburg, MD 20879.

QSLs & RUBBER STAMPS—Top Quality! Card Samples and Stamp Information 50¢. Ebbert Graphics D-2, Box 70, Westerville, OH 43081.

QUADS, QUADS, QUADS. 2, 3 & 4 elements, complete kits, fiberglass spreaders, components, wire. 3 first class tamps for complete brochure. db ± Enterprises, Box 24, Pine Valley, NY 14872.

HIGHEST PRICES PAID for gold-plated PCB fingers, pins, tantalums, IC's, transistors, diodes, other scrap. W6TWT, 10105 Stern, Cupertino, CA 95014.

SELF-STICK labels with call, name, address. 200 for $3., 500 for $5. N1BIC, 70H Florida Hill, Ridgefield, CT 06877. Free postage!

WANTED: Hammarlund SPC-10 Converters in good and unmodified condition, preferably with original manuals. Depending on condition, top prices will be paid. Please state condition and give your telephone number and when to reach you. B.J. Cosman, ex-W1BOA, 15 Ridge Street, Arlington, Mass. 02174, tel. 617-272-4421 days.

SATELLITE TELEVISION! A small ad with big savings! Don't pay too much—call us! Communications Consultants, P.O. Box 5099, Fort Smith, AZ 72913. Phone 501-452-3149.

POLICE-FIRE-AIRCRAFT Scanners: Bearcat 100–$289.95, BC-350–$384.95, BC-250–$268.00, Regency D-810–$269.95, M-400–$239.95. Frequency Directories. Shortwave Receivers. Sony-2001–$298.99, ICF-6500–$189.95, Kenwood R-600–$344.95, R-1000–$419.95. Also Panasonic and Yaesu Receivers. True Discount Prices & Free UPS Shipping in the Continental USA. GALAXY ELECTRONICS, Box 1202, 67 Eber Ave., Akron, OH 44309.

"FREE RADIO COMMUNIQUE." Monthly magazine concerning "pirate radio" stations. Inside information. $6.95 yearly! A*C*E, Box 452, Moorhead, Minnesota 56560. Information/Sample 25¢.

HAVING GONE from CB to Amateur Radio three years ago, have a good General Coverage Receiver. Would like a low-price, used General Coverage Transmitter or Transceiver. Also 6 meter and 2 meter transceiver tube type or anything. KAØEPP, R.R.1, Box 13BA, Zim, MN 55799, phone 1-218-744-3179.

COLORFUL QSL's: Including Day-Glows and Woodgrains. Samples 50¢ (refundable with order). SPECIALTY PRINTING, Dept. C, Box 361, Duquesne, PA 15110.

MILITARY FM RADIOS, Headphones, Microphones, speakers, and more. For free catalog, send self-addressed stamped envelope to: H. Ancerys Communications, P.O. Box 614, Antioch, CA 94509.

WANTED: MS connectors used or new, synchros, tubes, etc. Send list. Bill Williams, PO #7057, Norfolk, VA 23509.

WANTED: Early Hallicrafter "Skyriders" and "Super Skyriders" with "Silver" panels. Also "Skyrider Commercial" early transmitters such as HT-1, HT-3, HT-19, and other Hallicrafter gear, parts, accessories, manuals. Chuck Dachis, WD5EOG, The Hallicrafter Collector, 4500 Russell Drive, Austin, TX 78745.

WANTED: Surplus 1–3 KW HF Transmitter type FRT-15, Collins TDH or equivalent or higher power up to 20 KW. SSB not necessary. P.J. Plishner, WA1LDU, 2 Lake Avenue Ext., Danbury, CT 06810.

FREE TRS-80 AMATEUR RADIO SOFTWARE LISTINGS! Best in the country! Most popular! SASE to Micro-80 Inc., 2665 Busby Court Rd., Oak Harbor, WA 98277.

INTERNATIONAL DIRECTORY OF AWARDS listing over 1000 certificates, some applications, $8.00. W5IJU, 2618 McGregor Blvd., Fernandina Beach, FL 32034.

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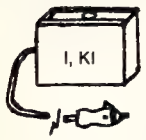

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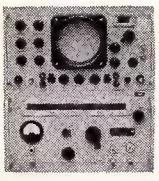

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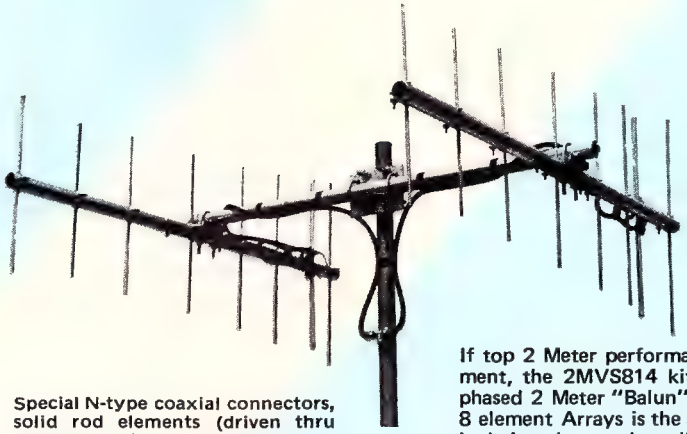

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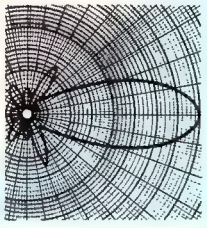

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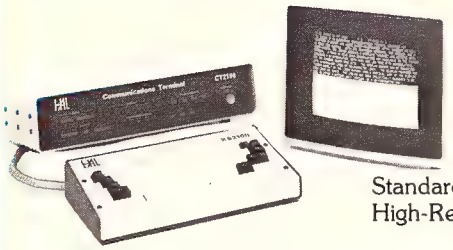

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World Class Performance and Features

The FT-ONE is the culmination of an all-out design project by Yaesu's top engineering team. Working without the usual cost constraints, Yaesu's design group is proud to unveil the instrument they "always wanted to design," a revolutionary blend of computer and RF technology.

GENERAL COVERAGE, ALL SOLID STATE

The FT-ONE is a full-coverage all-mode transceiver, equipped for reception on any frequency between 150 kHz and 29.99 MHz, with transmit coverage on all nine present and proposed amateur bands. In countries where permitted, the FT-ONE may be programmed to transmit throughout the 1.8-29.99 MHz range.

KEYBOARD FREQUENCY ENTRY

Fully digitally synthesized, the FT-ONE uses a front panel keyboard for initial frequency entry. Frequency change is then accomplished via the main tuning dial or the pushbutton scanner, with tuning in either 10 Hz or 100 Hz steps possible. Truly the contester's dream, the FT-ONE permits extremely fine tuning and instantaneous band change with equal facility.

DUAL VFO SYSTEM

Ten digital VFO's with memory are provided, in conjunction with an A-B selection scheme that allows instant recall of any transmit, receive, or transceive frequency desired. For split-frequency operation, such as on 7 MHz SSB, the operator may select TX on VFO-A and RX on VFO-B, automatically storing the calling and listening frequencies for each pile-up. For net operations, a non-volatile memory board is available as an option, to eliminate the possibility of dumping memory.

FULL CW BREAK-IN

Recent advances in solid-state technology have finally made full CW break-in reliable enough to be incorporated into a Yaesu product. Now you can select traditional semi-break-in (for use with amplifiers not equipped for full break-in) or full high-speed break-in. When using amplifiers so equipped, the keyer output lead may be interrupted via a rear panel jack and routed to the break-in sequencing input on your amplifier.

SWITCHING REGULATOR POWER SUPPLY

Extremely compact and light in weight, the switching regulator power supply reduces substantially the space required to produce the operating voltages used in the FT-ONE. Highly efficient and uniquely stable, the switching regulator supply provides superb reliability in a field of design long neglected by amateur manufacturers.

ELITE CLASS PERFORMANCE FEATURES

In addition to the full break-in and superb receiver filters, Yaesu's design team packed the FT-ONE with subtle virtues that others might have overlooked. Rear panel jacks allow the use of both an external receiver and an independent receive antenna, such as a 160 meter Beverage. While scanning, automatic halting on a received signal may be programmed. . . perfect for watching a band for openings. If you're a DX-peditioner, an optional Curtis 8044 keyer board is available, so you won't need an external keyer that only wastes suitcase space. And if your amplifier fan is louder than it should be, there's even a microphone squelch (AMGC) to reduce background noise pickup between words and sentences!

ONE YEAR FACTORY WARRANTY

Because of the level of attention to design detail, parts selection, and factory quality control, your FT-ONE is backed by a one-year *factory* warranty for the original purchaser at retail. Prompt and meticulous attention to your warranty needs will be provided by our Ohio And California Service Centers. In addition, all units sold in the United States will be inspected and tested after clearing Customs, and will include a Service Manual in the puchase price.

GAIN/INTERCEPT OPTIMIZED RECEIVER FRONT END

Utilizing up-conversion with a first IF of 73 MHz, the FT-ONE RF amplifier stage uses push-pull power transistors configured to produce a typical output intercept of +40 dBm. The first mixer utilizes a diode ring module followed by a low noise post amp, for optimum noise figure consistent with modern day intercept requirements. The result is a receiver with a typical two-tone dynamic range well in excess of 95 dB (14 MHz, CW bandwidth). Additional gain tailoring is provided via a PIN diode attenuator controlled from the front panel.

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EXPANDED OPERATING DISPLAYS

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